Proceedings of

The Radio Club of America, Inc.

Volume 44, No. 1 First Quarter 1968

Founded 1909

FROM DRUMS TO MOBILE RADIO

WIRE TO RADIO AND BACK TO WIRE

CAPT. J. H. ROUND, 1881-1966

THE RADIO CLUB OF AMERICA, INC.

250 Park Avenue, Room 604, New York City

Founded 1909, New York, U.S.A.

The Radio Club of America, Inc.

250 Park Avenue, Room 604, New York City 10017

Organized for the interchange of knowledge of the radio art, the promotion of good fellowship among the members thereof, and the advancement of public interest in radio.

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PROCEEDINGS OF THE RADIO CLUB OF AMERICA

Volume 44 First Quarter 1968 No. 1

FROM DRUMS TO MOBILE RADIO

The following is a history of Mobile Radio Communications reprinted from a brochure published by Link Radio Corporation with the permission of Fred M. Link, founder of the company and its president and sole owner for 20 years. When reading this remember that it was written and first published in 1940.

In darkest Africa the black man developed one of the earliest forms of Wireless Communication, the Drum, how long ago no man knows. He needed it for in the heart of his vast country, which was one unbroken forest without roads, traversed only by footpaths, it became necessary to communicate messages to his fellow man.

War, hunting, fishing, sickness, death, were all of prime importance to the savage.

Men went away out into the jungle forests to hunt. Women traveled to cultivate far distant garden clearings. Word came to town that enemy tribes were on the warpath; or perhaps some important member of the tribe had met death, his funeral was of major importance; a man's wife ran away, messages must be sent along her pathway of escape to catch and hold her.

The practical answer to all these important needs was the Drum which, by relay, sent messages from one town to another covering great distances. Messages are sent by "tone" rather than by words spelled out. Certain tone-rhythms convey certain understood sentences.

FIRE

The torch appearing between the flags on the insignia of the Signal Corps is one of the oldest forms of communication known to man—Fire . . .

Beacons kindled on high elevations to communicate vital messages are referred to in early classical literature:

> "Set up a sign of Fire in Beth-haccerem, for evil appeareth out of the north."
>
> Jeremiah 6-1

From Jerusalem to Babylonia the early Jews had a system of fire signals along a chain of hilltops.

The ancient Greeks flashed home the news of the fall of Troy by a sequence of prepared beacon fires built at strategic points on the Aegean Islands and on the mountain tops.

Down through the centuries fire was a most important form of communication. As late as 1775 Paul Revere still used the light of his lantern to carry his message of warning through the night.

SMOKE

Before the Christian era, when the Romans sent expeditionary legions to Britian, it was discovered that the aboriginal Picts had developed a very complete set of communications through the use of smoke puffs produced by blanketing a fire.

Later, when our covered wagons trekked their weary way westward, those hardy Pioneers, looking for new homes in the wilderness, found that the Indians used these same smoke signals to announce well in advance the coming of the pale-faces. In many cases this made possible the annihilation of wagon convoys crossing the western prairies.

At that time no white man had perfected any system of signals so effective.

GALILEO

Early in the seventeenth century, the Italian astronomer, Galileo, invented the Telescope, making it possible to magnify a visual signal from a source too far away to be seen with the naked eye. This was a vital step forward in the realm of communication.

Galileo was greatly honored for the telescope's application to signalling. A device that would bring advanced tidings of the arrival of 'treasure laden' ships was highly appreciated by commercial men.

SEMAPHORE and TELESCOPE

In the eighteenth and early nineteenth centuries the word, 'telegraph', was applied to long visual signalling lines.

The prefix, 'tele', means, 'far off'. The words, telescope, telegraph, telephone, teletype, and television, all bearing this prefix, show the sign of a new phase in signal communication.

A telegraph station consisted of an observer with a telescope to pick up signals and a semaphore to relay them to the next station. This system of semaphore lines was constructed from Cape Cod to Boston and from Coney Island to New York City; still another such system was located on San Francisco's Telegraph Hill, all to report in advance the arrival of some important clipper ship.

Samuel F. B. Morse was by profession a portrait painter. In 1832, returning to America from England on the sailing ship, Sully, he conceived the idea of a magnetic telegraph—and at the same time worked out a code of dots and dashes to carry the message over wires. Three years passed—Morse was penniless—nothing happened.

In 1835, Morse was appointed instructor of Art at New York University. He rented a garret room where he ate and slept; every spare minute he could find he worked on his discovery. He finally obtained the help of a brilliant young student, Alfred Vail, and, in a factory loft in Morristown, N. J., the Electro-Magnetic Telegraph was finally born.

On March 3rd, 1843, after eight years of heartbreaking difficulties, Morse was granted an appropriation of $3,000 by Congress, to build a telegraph line from Washington to Baltimore. The first message sent was:

"What Hath God Wrought."

Now many millions of miles of wires carry messages to all parts of the world.

BELL

Alexander Bell in an attic room and his assistant, Thomas A. Watson, in an adjoining room experimented with tuned harmonic reeds. We quote Watson's statement of what happened on June 2nd, 1875:

> "I was plucking a stuck reed, when a sound shaped electric current passed through the wire from my work-room to Bell's; he heard for the first time the tones and overtones of a sound transmitted by electricity."

There followed nine months of ceaseless effort before Bell's "brain child" uttered its first sentence.

Bell had moved to 5 Exeter St., Boston, where he rented two rooms, a shop and bedroom, for $4.00 per week. A wire ran from one room to the other. On March 10th, 1876, Bell was in his shop and Watson was in the bedroom with a receiver to his ear. Bell accidentally upset a jar of battery acid over his clothing. Excitedly he called: "Mr. Watson, come here, I want you." The instruments were so adjusted that Bell's voice carried distinctly over the wire to Watson. Bell's vision had become a reality—it talked.

1876 was the year of the Philadelphia Centennial Celebration. Bell reserved an exhibition space but his funds were so low that he had to borrow money for train fare from Boston to Philadelphia. His small display table was lost in the vast expanses of the hall. No one paid any attention to his fantastic story.

Towards the close of a hot, muggy summer day about the time Bell had given up hope of obtaining any financial help, he saw a group of influential looking men approaching. Suddenly the leader stopped and extended his hand. "Professor Bell, I'm delighted to see you again!" It was Dom Pedro, Emperor of Brazil, whom Bell had met in former years. The Emperor said, "What have we here?" Bell demonstrated his instrument. Dom Pedro placed the receiver to his ear, listened a moment and sprang to his feet exclaiming, "God save us, it talks!"

Lord Kelvin, of Atlantic Cable fame, next listened, saying, "It does speak, gentlemen! This invention is the most wonderful thing in America!"

The next morning, the newspapers blazoned the story, bringing great attention to Bell and his invention.

Once upon a time

The latest

WIRELESS COMMUNICATION

Near the beginning of the twentieth century, a new unit of energy was being investigated by many leading scientists. It was the 'electron', which was destined to advance the science of communication to undreamed-of horizons. The phenomena of our modern radio have resulted largely from the mental feats of an English mathematical physicist, **James Clerk Maxwell.**

Maxwell correlated the theories and surmises of **Faraday** and other electrical pioneers and through intricate mathematics established on paper the fundamentals of radio. He also discovered the speed of light to be 186,000 miles per second. **Einstein** later found this to be the general speed limit of the universe. Maxwell concluded that the light by which we see is a form of electro-magnetic radiation, a conclusion which stands confirmed by modern science.

Heinrich Hertz, a German scientist, put Maxwell's theories to work at Karlsruhe, Germany, in 1888. Hertz first demonstrated in his laboratory the superswift transmission of electro-magnetic oscillations, using two large metal balls and a loop of wire with a gap in the center, across which live sparks jumped through space. Hertz never realized the importance of his vast discoveries, since he died soon after this at the early age of thirty-seven.

Guglielmo Marconi, a brilliant young student of the theories of Maxwell and the accomplishments of Hertz, had the intuition that these waves might furnish mankind with a new and powerful means of communication. At his father's estate in Italy, at the age of twenty-one, Marconi began making his own tests. After several years of hard work he developed sensitive instruments and was able to send 'The Message' for a distance of

two miles. Hertz had used two metal balls for his oscillator; Marconi's conception was different. He used the earth, itself a metal ball, as one of his terminals and a great length of wire reaching upward into the heavens as the other. Then and there the Radio Antenna came into being.

One hundred and fifty years after **Benjamin Franklin** sent his kite aloft to learn the secret of electricity, another inquiring mind was sending a kite into the heavens along the coast of Newfoundland to bring out of the ether a message carried by electric emanations from far across the sea.

Guglielmo Marconi had, in 1899, sent wireless communications across the English Channel and in 1901 we find him and his assistants on the bleak coast of Newfoundland. Marconi sat for an hour with his ear glued to a receiver attached to a kite antenna. He knew **Fleming** was at his sending instruments in Cornwall, England, tapping out **Morse's** code letter "S" which is three dots. Finally, just after noon faint clicks were heard. He listened intently—then with a never-to-be-forgotten thrill he heard distinctly the first wireless communication across the broad Atlantic.

STEPPING STONES TO WIRELESS

Theory. JAMES CLERK MAXWELL was born in Edinburgh, Scotland, in 1831. He entered the University of Edinburgh and later went to Cambridge. From 1860 to 1865 he was professor of physics at Kings College in London. There he met Faraday whose theories and surmises on the subjects of 'Time' and 'Space' intrigued him greatly.

Science. HEINRICH HERTZ was born in Hamburg, Germany, in 1857, the son of a lawyer. He became a student of technical science but soon decided to devote himself entirely to physics. After three years of study in Munich and Berlin he became assistant to Helmholtz and later entered Kiel University. He taught at Karlsruhe Technical High School in 1888 and there the Hertzian or Radio Wave was born.

Invention. GUGLIELMO MARCONI was born in Bologna, Italy, in the year 1874. His father, Giuseppe Marconi, was an able business man and a gentleman of means. His mother, history tells us, was a keen-witted blue-eyed Irish girl. Their son was destined to bring everlasting glory to Italy. Marconi grew up to be a clever electrical engineer with a keen mind for business.

STEPPING STONES TO ELECTRONICS

THOMAS A. EDISON, in 1884, unintentionally built the first Vacuum Tube. While developing the electric light he noticed the effect of the play of electrons in the semi-vacuum of an incandescent lamp. To confirm his suspicions that something new was happening, Edison set up a metallic plate in such a position that he was definitely conscious of the flow of electric current through 'space' in the tube. He thus established the basis of the modern Electronic Tube. However, two decades passed before this Edison Effect was utilized.

JOHN AMBROSE FLEMING, Marconi's chief engineer, found, through experimentation, that this Edison Effect placed between the antenna and the ground connection of a receiver could be used as a 'valve', offering means of detecting radio signals. Thus, early in the twentieth century, the Fleming valve theory added to the Edison Effect created the Diode Tube Detector, which marked a new milestone in the advancement of electric communication.

LEE DeFOREST at this time saw great possibilities in this electronic 'Tube-in-the-making'. He realized that means must be found to further direct the electrons' course through space. Fleming's valve had acted as a 'do not enter' sign on a one way street; DeForest added a grid to the diode tube which established 'stop' and 'go' signs. This grid also acted as a speed control system for the regulation of electronic traffic. DeForest's 'Triode' tube became the Electronic Amplifier which ushered in a new day in radio communication.

RADIO ENTERS

In 1907, Lee DeForest had produced and patented the triode or audion Tube; later **Dr. H. D. Arnold** of Bell Telephone Laboratories and **Dr. Irving Langmuir** of General Electric Research Laboratories added their contribution of "high vacuum" to the DeForest tube and radio started on a dramatic career destined to revolutionize the scope and trend of all modern living.

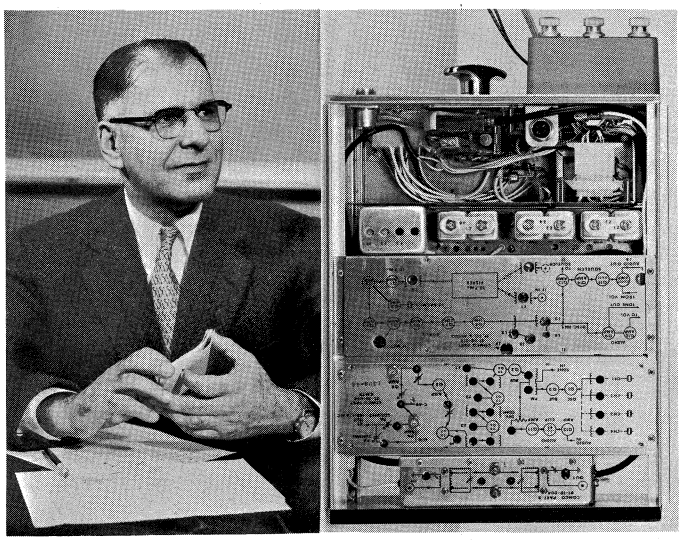
What a thrill to watch "Junior" in the basement with a table full of contraptions, earphones glued to his head, trying to make his crystal set work! Later another thrill to switch on your first set, turn the dial and pick up **KDKA** or some station nearer home. Quality of reception did not matter, the important thing was to brag next day at luncheon that you "got Davenport, Iowa", or that just after midnight you "almost had Los Angeles".

Broadcasting and reception were in a very formative state. On July 23, 1909, the steamer, **Republic,** flashed an S.O.S. by means of its new wireless equipment. The message brought nearby ships to the scene of the disaster and many lives were saved. April 14, 1912, the **Titanic** went down but not before its radio signalled for help. This greatest sea tragedy of all time proved the value of radio as seven hundred lives were saved. Wireless was becoming an absolute necessity for ocean traffic . . .

World War I again brought radio dramatically to the front as modern science and unlimited sums of money were made available for its development. Scientific investigation for war purposes had done much to improve radios. They could now be found in an increasing number of homes. The demand came for radios in automobiles; these were soon developed and operated

successfully. At this juncture an urgent need was felt for police communication to aid in crime detection and the enforcement of law and order in our communities.

THE WHOLE BROAD SUBJECT OF RADIO NOW BRANCHED INTO TWO MAJOR DIVISIONS, BROADCASTING AND COMMUNICATIONS. Broadcasting confined itself to the fields of education and entertainment while communications devoted itself to man's information and protection on sea and land. At this point we stress the accomplishments of man's ingenuity in the field of **Mobile Radio Communication,** which has assumed tremendous proportions in the past few years. Following is the story of the achievements in this field of a small group of earnest radio engineers headed by **Fred M. Link**



In the early days of civilization, man fought for his very existence in order to live in competition with the animal world around him. Finally God gave him dominion over the lower orders of life; he developed a civilization in which the forces of law and order predominated over the forces of evil. Never in the history of the human race has there been a time when man could relax for a moment his effort to uphold that balance of power for good.

Now in the advanced twentieth century we find organized crime flourishing throughout the entire world. Man carries on a ceaseless fight against such crime and also to protect his fellow man from the ravages of the elements, from flood and fire, from disease and famine. Through man's ignorance and stupidity, unnecessary accidents take a staggering toll in all walks of life.

Mobile radio is playing a great role in the world today, doing its part in upholding these important forces of law and order. Statewide Police Radio now covers the greater portion of the United States with the Eastern Seaboard almost solidly protected by modern Link FM equipment. Public Utilities all over this broad land are realizing that the cost of radio equipment, its installation and maintenance, is paid for many times over through the "speed up" of all their activities. Railroads and highways will soon be radio controlled. Our government uses mobile radio communications systems in the U.S. Armored Forces, Field Artillery, Signal Corps, Navy, Marine Corps, Coast Guard, Secret Service, Civil Aeronautics Administration, FCC, FBI, and many others.

As the motor car speeds over super-highways which have replaced the old wagon trails, as palatial steamers plow across the ocean where slow sailing ships fought the waves only a short time ago, and as the modern clipper ship wings its way into the heavens, annihilating time and space, so has come into being a method of radio transmission known as FM (Frequency Modulation) which is revolutionizing the entire field of emergency radio communications.

AM (Amplitude Modulation) is the most generally used method of broadcasting over certain prescribed air lanes. By this method you hear the programs coming from your home radio; but it is not entirely free from interference. Man-made and nature-made static overrides the AM carrier wave and often raises havoc with some favorite program to which you are listening. One could overlook this disturbance on his home radio, but emergency radio communication, especially in war time, was a different thing. Interference was an obstacle that had to be eliminated if possible.

Major Edwin H. Armstrong, internationally prominent radio expert and unquestionably one of the foremost inventors in the field of communication of all time, worked out a successful method of radio transmission and reception; this he called **Frequency Modulation** simply because the radio signal was varied in frequency rather than in amplitude in order to get variations in volume and tone. This relatively new method of radio inherently reduced the interfering effect of both nature-made and man-made static thereby greatly improving the art of communication.

YOUR NEW MEMBERSHIP COMMITTEE CHAIRMAN

Bill Offenhouser, our new president, has appointed Julian Sienkiewicz chairman of the Club membership committee for 1968. In addition, Julian has been named banquet chairman.

In our drive for 68 new members in '68, give Julian a hand. Get application forms from him and send completed application forms addressed to Julian Sienkiewicz, c/o Davis Publications, 505 Park Avenue, New York, N.Y. 10002. His phone number is (212) PL 2-6200.

John P. Taylor has been named vice president-market programs of the RCA Commercial Electronic Systems Division whose product lines include communications, broadcast and instructional equipment and systems. He joined RCA in 1930 upon graduation from Harvard.

EDITORIAL

The advances in radio since the Club was founded 59 years ago are so numerous and significant that it is physically impossible for any one person to be fully informed on all its facets. At one time, almost everyone in the field knew or had at least heard of each other. Now it is such a big industry that only some of the top executives and prolific writers have ever been heard of by newcomers to the field.

Today, the engineering personnel recruiter wants to know of an applicant what degree he holds and from what college it was awarded, and what is his specific area of "specialization." He doesn't ask the applicant if he can actually design equipment or attempt to determine if he has imagination. The prospective employer often requires job applicants to take psychological tests to determine if he is emotionally fit to work with other engineers.

Somehow, the system doesn't really work as well as the industrial psychologists think. Many times, the man with unusual drive and great creativity is turned down. The giant electronics firms point with pride to the "numbers" of engineers they employ, not to their capabilities.

On the other hand, recent graduates have been exposed to much more information than the old timers because so much more information is available. Even so, it takes a "team" of engineers months, sometimes years, to develop a product or system which could have been conceived and put into production in a much shorter time by far fewer (perhaps even one) "practical," experienced engineers.

We are now in the age of "specialization." As **Dr. Raymond Villers** put it "not so long ago, a shoemaker was an *engineer* (designed shoes), a *purchasing agent* (bought material), *craftsman* (made shoes), *salesman* (sold shoes), and an *accountant* (handled money and calculated his profit or loss). But today, a typical shoe factory has 1000 employees, none of whom knows how to make a pair of shoes."

Very few members of this club are actually specialists. Most are well-rounded, capable of inventing, designing, fabricating, selling and calculating costs.

Many of the younger engineers are brilliant and are especially competent in very narrow areas. But, how many of them can single-handedly design an SSB ham rig or even a superheterodyne receiver and then assemble it and make it work?

For these "specialists," there are scientific societies whose meetings they can attend to get "specialized" information on "specialized" subjects. The specialists are part of a machine, sometimes a very important part. But, in general, they do not fraternize with each other, even other parts of their machine.

Fortunately, there are still some "individualists" in the industry who want to get together with other "individualists" — self-made men, including those without formal education and even those with doctorates.

The Radio Club of America consists of a group of "individualists," most of whom have made significant contributions to radio and electronics. The Club members fraternize and exchange ideas.

Fortunately, there are still many "individualists" who should be encouraged to join the Club and *attend its meetings.* The Club's meetings offer diversification and thought stimulation. Thanks to the meetings and papers chairman, each meeting covers a new area—often a new one which most specialists have never heard of. The papers published in the Proceedings, listed elsewhere in the previous issue, clearly illustrate the diversity of the subject matter.

Our former editor, **Edgar H. Felix,** summed up the position of the Club quite aptly when he reported *"the technical organizations in our field have hewed very strictly to engineering while the industry trade organizations have looked upon their function to be one of maintaining the status quo and profit standards of the industry. Yet, current technological developments will continue to upset the status quo as new means of distributing programming and communications, making the old audio network organizations even more obsolete and inadequate than they now are."*

The Radio Club of America, *which is somewhat broader cut than the technical or trade associations, is in a position to take leadership in industry discussions and forums looking toward higher public service standards and maximum cultural and educational benefits to those who support the industry."*

HAPPENINGS

Bell Labs commemorates 20th anniversary of the **transistor**—1966 banquet master of ceremonies **W. Walter "Wally" Watts** promoted by RCA to senior group executive vice president—**Walter Lyons** is back from Singapore—**Gonset** amateur radio product line acquired by **Aerotron** — former Stromberg-Carlson president and Philco vice president **James D. McLean** appointed director of international industrial cooperation for U. S. Department of Transportation—**John Ashton,** radio pioneer, remarries and moves to Santa Cruz, California from Palo Alto—**William H. Forster,** formerly with **Philco,** now technical director for **ITT-Europe,—Dave Talley** now with **Ebasco** — **Julian Sienkiewicz** elected president of Electronics Press Club—**Lionel Rodgers** upped to vice president of **Automatic Signal** division of **LFE—Cap't. W. G. H. "Bill" Finch** back from Tucson —**Ivan Loucks,** former chief of **FCC** amateur and citizens radio division, retiring in March from post as signal and communications engineer, Association of American Railroads.

WIRE TO RADIO AND BACK TO WIRE

by

LEO G. SANDS

Radio is entering another stage—back to wire transmission because of the lack of radio spectrum space for mobile communications. Within the meaning of **radio** is television.

As of the end of 1967, there were 1933 CATV (Community Antenna Television) systems in operation serving 2798 communities. There were 1867 systems under construction and 2330 applications for permission to operate CATV systems in 1330 cities were pending. Millions of homes now receive television programs through cable, both those picked up off the air and those originated by CATV system operators.

In fact, television is going back in a sense to the format of radio back in the 1920's. In addition to programs broadcast by network, independent and educational television stations, many CATV systems operators originate programs for closed circuit transmission to their subscribers. These programs are generally of interest mainly to the communities served and to certain segments of the public.

In addition to television programs, CATV systems distribute off-the-air and locally originated radio programs which can be tuned in with an FM broadcast-band receiver. Some systems also transmit background music and other program material for reception by special subscribers on other than FM band frequencies, requiring the use of special receivers and, sometimes, the use of an unscrambler.

CATV started in Pennsylvania about 20 years ago. Facilities were installed which would enable the residents of a community, which was beyond the useful range of TV stations, to share a distant, common antenna system located at a point where TV signals could be received. Since then, the CATV industry has grown rapidly, system operators now reportedly buying $100-million worth of equipment annually.

It has been suggested that all TV broadcasting be through cable, making the 492 MHz of radio spectrum space, now allocated to TV broadcasting, available for other purposes. This space could accommodate almost 25,000 FM, 50,000 AM or 100,000 SSB radiotelephone communications channels.

The use of CATV is not limited to communities where there are no or too few TV broadcasting stations. CATV systems are being installed in large cities, even in New York City, in order to provide better reception, particularly of color programs.

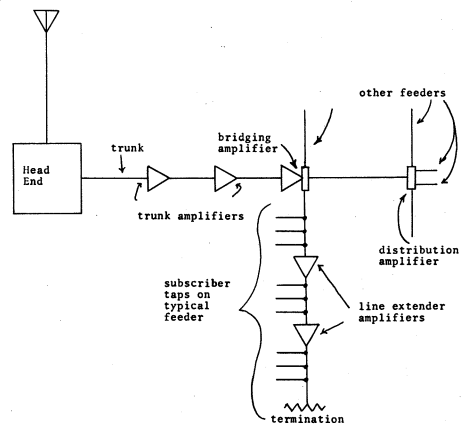
A CATV system consists of an antenna system at a good receiving location, a **head end,** a trunk line and a distribution system employing coaxial cable as the transmission medium.

The head end is equipped with RF amplifiers or frequency translators, one for each TV channel to be distributed plus an amplifier for the FM broadcast band. Some are also equipped with TV modulators and FM modulators for transmission of locally originated TV and radio programs. Frequency translators are used for receiving UHF television stations and transmitting their signals on a VHF channel. They are also used for translating VHF channels from one to another for the purpose of eliminating picture ghosts resulting from direct pick up of a local station's signals by the receiver's front end wiring and delayed receipt of the signal through the cable system.

All of the signals (as many as 12 TV plus FM radio) are combined and fed into a **trunk** line coaxial cable which runs into the communities served. These signals lie between 54 MHz and 216 MHz, with the 72-76 MHz and 108-174 MHz spaces usually unoccupied.

Since the attenuation loss of 0.75-inch diameter aluminum sheath trunk line coaxial cable at 216 MHz (Channel 13) is almost 1.0 db per 100 feet, in-line amplifiers are required at intervals of approximately 2,000 feet. These amplifiers must pass all signals within the 54-216 MHz range. The trunk line is tapped through **bridging** amplifiers whose outputs are applied to **feeder** cables. Signals are conveyed to TV and FM receivers through a **subscriber drop** connected to a feeder cable through a resistive, capacitive or inductive **tap** or a **directional** coupler. To make up for tap and attenuation losses, **line extender** amplifiers are inserted into feeder cables.

The entire system from the antenna baluns to individual CATV subscriber outlets, employs 75-ohm coaxial cable as the transmission medium. Considering the high transmission losses at VHF, present CATV techniques are not ideal, but they are compatible with existing TV and FM receivers.



TYPICAL CATV SYSTEM

Not all CATV systems are limited to transmission of signals in the 54-216 MHz range. Some are capable of transmission of 20 TV channels within the 120-240 MHz range. All subscriber receivers are equipped with a converter with which the 20 channels are selected and which feeds the signals to a TV receiver set to a specified VHF channel. Some systems transmit some of the signals through the trunk line over sub-VHF channels (5.75-45.75 MHz), translating them back to VHF television channels at the point where distribution begins.

"Elementary, my dear Watson." The cable transmission show is only beginning. Since coaxial cable can be used for transmission of signals from DC through VHF, only 30% of its capability is being utilized by so-called "fully-loaded" CATV systems (12 TV plus FM). Transmission need not be unidirectional. By providing appropriate filters, splitters, mixers and couplers, a CATV system can be designed to enable bidirectional transmission, within the 54-216 MHz (or higher) in one direction and below 50 MHz in the other direction. It's already being done and several sophisticated bidirectional CATV systems are in the planning stage.

A bidirectional CATV system can be used for unidirectional transmission of TV and radio programs to the public as well as for bidirectional transmission of CCTV, data, facsimile, telegraphy, telephone and telemetry. The capabilities of CATV are limited mainly by lack of imagination.

Dr. Pierce of Bell Labs said last year "the revolutionary possibility in mass communications lies in the full utilization of the capabilities of CATV." W. Walter (Wally) Watts, a distinguished member of The Radio Club of America and a senior group executive vice president of RCA, also pointed out that CATV has tremendous potential. He cited, as an example, that people could vote for political candidates without leaving their homes, indicate their reactions to TV programs, etc.

CATV, which is becoming to mean much more than "community antenna television," has almost unlimited potential. Imagine the capabilities for transmission of bidirectional intelligence when the entire nation is linked through coaxial cable. The trend has started and will continue. It's still radio, but the transmission medium is wire.

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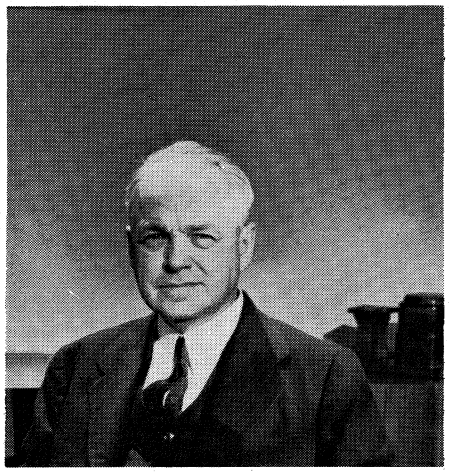


Orestes Caldwell 1888-1967

The man who coined the term *"electronics"* died in Greenwich, Conn. on August 27. Dr. Caldwell attended Purdue University where he earned his B.S. degree in 1908, his E.E. degree in 1931 and his doctorate in engineering in 1933.

He served on the Federal Radio Commission from 1927 to 1929. He was a member of the National Television System Committee from 1951 to 1954. He was a Fellow of the IEEE.

Dr. Caldwell is best remembered as an editor, starting his career in 1907 as an assistant editor of *Electrical Review* and later serving as an editor of *Electrical World* and *Electrical Merchandising*. He was editor of *Radio Retailing, RadioToday, Electrical Week, TeleTech, Electronic Industries, Television Retailing,* and *Electronics* of which he was also co-founder.

George Washington, Jr. 1899-1966

George Washington, Jr., a former vice president of the Club, died December 26, 1966, after a long illness, in Morristown, New Jersey. He was the son of the inventor of instant coffee. And, he was the developer of a revolutionary new photo-engraving method, now in wide use. Mr. Washington was born on Staten Island and attended Brooklyn Poly Prep and Milford Academy.

C. W. Hansell 1898-1967

Clarence Weston Hansell, a famous radio pioneer died October 20 at the age of 69 on Merritt Island, Florida. He retired in 1963 from his post as a *research fellow* at the David Sarnoff Research Center (RCA) in Princeton, New Jersey.

Dr. Hansell was born in Medaryville, Indiana and was an alumnus of Purdue University.

He started his long career with General Electric and joined RCA in 1920, and was issued more than 300 U.S. patents.

Dr. Hansell pioneered in trans-Atlantic radio telegraphy and contributed greatly to the development of shortwave radio, infrared technology, microwave, FM radio, color television, radar, aircraft radio and air ionization.

George C. Hees 1899-1966

George Charles Hees, a life member of the Club died on June 1, 1966 in Mineola, New York. The radio pioneer was graduated from Pratt Institute and was associated with Sperry Gyroscope Company until he retired in 1962.

Hugo Gernsback 1884-1967

One of the most well known men in radio, Hugo Gernsback died on August 19 at the age of 83.

Once in a while, a man comes along with such talents of intellect and imagination that he can anticipate the wonders of the future. H. G. Wells was such a man; Hugo Gernsback was another. Unlike Wells, however, Mr. Gernsback not only wrote about "Things to Come," but contributed concretely to the world in which we live. He was a writer, inventor, and publisher.

Born in 1884 in Luxembourg, Mr. Gernsback came to the U.S. in 1904, and at the age of 24, was already the owner of the Electro Importing Company, publisher of *Modern Electrics,* the first radio magazine (later to be incorporated with Popular Science), and had written *"The Wireless Telephone,"* the first book on radio broadcasting ever written. He was indeed a remarkable man. In later years he published other technical magazines, *Electrical Experimenter* (1913), *Radio News* (1919), and *Radio Electronics* (1929). He also published the first science fiction magazines, *Amazing Stories* (1926), and *Wonder Stories* (1929). In fact, Mr. Gernsback is known as the father of Science fiction. In his book *RALPH 12YC4+,* published in 1925, he presented the world of the future—a world of fluorescent lights, automatic packaging machines, plastics, radio direction finders, juke boxes, tape recorders, rustproof iron (steel), and television. His was an inventive mind. He predicted, diagrammed and explained the principles of radar, long before radar became a reality. He was a man of "FIRSTS." He designed and manufactured the first home radio set in the U.S., called *Telimco* wireless.

He built the first radio battery. He owned and operated the first radio store in New York. He pioneered the first TV station, WRNY, in 1928, and operated it. In fact, he coined the word "television." He founded the Wireless Association of America, the Radio League of America, and the Short Wave league. Mr. Gernsback's role as editor and publisher was only one aspect of a prodigious set of accomplishments. He was the recipient of many honors and awards, including the Marconi Memorial Wireless Pioneer Medal, the Gold Medal of Luxembourg, and the Veteran Wireless Operators Award.

Hugo Gernsback will not soon be forgotten.

Capt. H. J. Round 1881-1966

by

Wm. H. Offenhauser, Jr.

Capt. Henry Joseph Round, "H.J." to his friends, a most distinguished *Honorary Member* of the Radio Club and warm friend of Major Armstrong and of the Club pioneers, passed away on August 17, 1966 at his home in Bognor Regis, Sussex, England, after suffering a slight stroke at the beginning of the year. He was 85. He was known throughout the world as "the father of British broadcasting."

He was a brilliant, prolific, creative, ingenious and witty individualist with 117 inventions to his credit, and an informal list of ideas of perhaps several thousand more. He had a boundless love for his old and trusted friends in wireless, and a love of life and living that was ever generous, never selfish. He was ever anxious to advance the wireless art, and was always in the forefront of that which he encouraged. He never showed any interest in finance in connection with his inventions; he just wasn't interested in money. He was a sparkling conversationalist and philosopher, with an ever-present cigar. He liked and breathed his favorite work and pasttime almost every waking hour of every day. He was indeed one of that rare breed—the gentleman scientist par excellence — a true peer of his friends and idols, Marconi and Armstrong.

H. J. was born on June 2, 1881 at Kingswinford, Staffordshire, England. His early schooling was at Cheltenham, and from 1889 to 1902 he studied at the Royal College of Science in London, gaining first class honors. While tutoring during this period, a pupil demonstrated to him some of the principles of Hertz and told him of Marconi, the man who provided the intellectual center of his entire later life.

In 1902 he joined the British Marconi Company and was sent to the USA as an instructor at the American Marconi Company's training school at Babylon, Long Island. In his spare time he studied powdered iron core inductances, for which he made the cores by mixing iron powder with paraffin wax. In 1906, because of a Marconi recession, he applied for a job with Thomas A. Edison, but turned it down because he felt that he could not live on $12.00 per week in New York.

Capt. Henry J. Round of England (right) received the prized Armstrong Medal from John Bose, president o fthe Radio Club of America, at the Club's 43rd annual banquet. The Medal was awarded to Capt. Round in recognition of his pioneering work in radio, especially in the fields of radio direction and position finding and the amplification of short-wave signals. During World War I the direction-finding apparatus he designed and operated made it possible to trace the movements of the German Fleet, making possible interception by the British Fleet in the Battle of Jutland.

For the next two years he worked for the New York Telephone Company at the Dey Street annex of the Cortland Street building, working evenings without pay, and often sleeping overnight in the Marconi office on Front Street. Here, at night, he did much of his study of frame (loop) antennas, and learned of the similarities between the workings of two loops at right angles, and the combination of a loop with a conventional single wire antenna. Here, too, Round's first wireless telephone was born.

Too often, perhaps, while at work during the day at the telephone company, the buoyancy of Round and two fellow engineers annoyed a quiet man next door. In 1908, that man, Theodore N. Vail, was elected president of the New York Telephone Company, and all three engineers left, quietly.

Round then returned to the Marconi Company in England where he made further studies of antennas and of oscillating vacuum tubes and put his findings to work promptly in the commercial operations of the company, the only one in the world to offer commercial transatlantic communication service from 1907 to 1912.

In 1912, H.J. went to the Upper Amazon where he accomplished 700-mile transmission with Marconi equipment. By on-the-spot rebuilding, he was able to transmit on 4,000 meters by day and on 2,000

meters at night to achieve the contract guarantee—with virtually no spare parts on hand at all. Earlier, he had greatly improved the performance of the Marconi transatlantic transmitter at Clifden, Ireland and had studied long distance signal propagation and its peculiarities.

After returning from Brazil, he began an intensive study of the vacuum tube and was one of the first to discover that it could generate continuous waves. By this time he was in the forefront of oscillating vacuum tube development. Soon, he had changed over the Clifden transmitter to vacuum tube operation with 10 kilovolts on the plates, something unknown elsewhere in the world for several years. In 1913-14 he demonstrated vacuum tube radiotelephony and patented important improvements, including the indirectly heated cathode.

At the outbreak of World War I, he was assigned by British military intelligence to build a network of direction-finding stations to cover the entire western front. These tube-equipped stations were so successful in pinpointing enemy transmitters and reading them that he was recalled to England to construct a second network there. In May 1916, he detected a seven-mile change of position of the German fleet through the Kiel Canal at Wilhelmshaven, 300 miles away. He reported to the Admiralty that the German fleet was about to put to sea. This was the forerunner of the Battle of Jutland. For his services, he was awarded the Military Cross.

In October 1917, Major Armstrong, enroute to France, decided to stop off in England and meet the man who had written such excellent articles in *Electrical World* and in the *London Electrician.* In the words of Armstrong, "An Englishman knows how to use the English language. When Round got through with one of his articles, you knew exactly what he meant, you understood it, and, H.J., you cleared up a great bit of my early thinking—and I'm proud to admit it." Here perhaps lies the secret for our hidden weapon today to keep under control "Today's Knowledge Explosion"—clear exposition. May H.J.'s tribe increase!

Round told Armstrong about his direction-finding work; Armstrong told Round about the makings of his superheterodyne. Round had already appreciated the need of the screening grid. He was a little chagrined to learn that Schottky, a German, had published about it in 1916.

The exchanges caused each man to listen raptly in wonder and admiration for the ingenuity and skill of the other. This was the real beginning of a deep and all-pervading friendship that lasted their entire lifetime.

Each man was so clear, so logical, so human, and so admirable to the other that it made an indelible impression, not only on the two men, but upon the entire world in which they lived. Far into the night they discussed ways and means of working their receivers in the short wave range from 500 KHz to 3 MHz, where Round had found German radio working, supposedly unknown to the British. Round had managed to get to 1.2 MHz, and Armstrong's Superheterodyne held the key for reaching to 3 MHz and beyond. It was dawn before the two great men could break away from one another.

In 1919, H.J. developed new types of transmitting tubes, and in March, directed the installation for Marconi of the radiotelephone transmitter at Ballybunion, Ireland which was the first European station to span the Atlantic by telephone. Further work led to broadcasts from Marconi station 2MT at Writtle, and to the establishment of the original Broadcasting House, 2LO, at Marconi House, for which Round designed the transmitting equipment.

In 1921 he was appointed chief of the newly formed Marconi - Research Group where his inventive genius became full-blown. He developed broadcast receivers, electrical phonographs, public address systems, reverberation systems for broadcasting, new types of microphones, tubes, pickups, amplifiers, sound recording systems including sound film, and a host of other devices and circuits. In 1931 he resigned to set up private practice as a consultant.

In 1937 he returned to Marconi again as a consultant on echo sounding and underwater sound. During World War II he worked on ASDIC and continued that work until 1950.

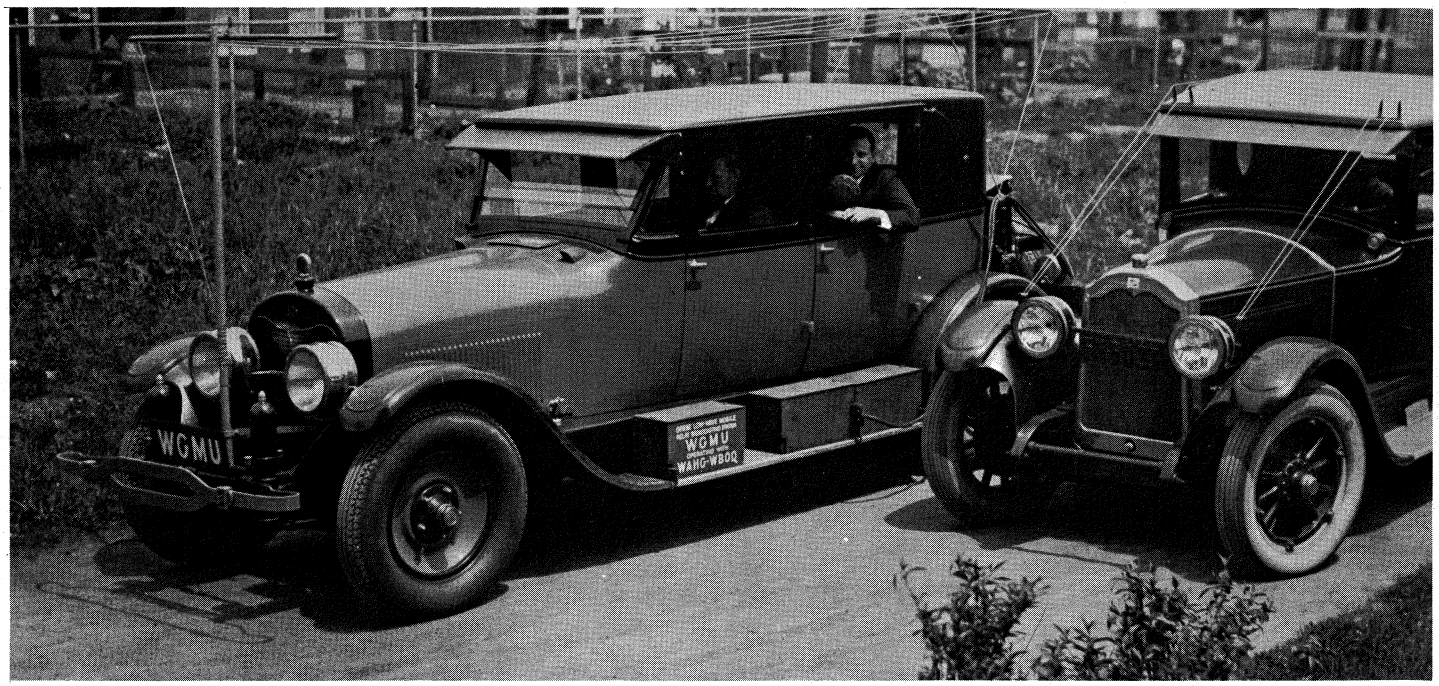
In 1952 he was presented with the Armstrong Medal of **The Radio Club of America,** and came to New York to accept the honor and to renew the many friendships he had made in his scientific home-away-from-home, the USA. The occasion was truly memorable; H.J. gave us at first hand much of the data in this short review. A portion of this in his own inimitable voice and breezy style, admirably British, is preserved in a disk recording given to every person who attended the **Radio Club Golden Jubilee Banquet** in 1959.

The world can produce only one **Henry Joseph Round;** his memory will live forever in our hearts and in our thoughts. We salute you, H.J., and wish you God speed to Valhalla with all our love and admiration, not only for your wireless, but also for your humanity as a fellow-man. *"Well done, thou good and faithful servant." May your spirit live forever.* 73 OM

RARE PHOTO WANTED

Anyone possessing a photograph of DeForest's Audion flame detector is urged to contact Julian Sienkiewicz, care of Davis Publications, 505 Park Avenue, New York, N. Y. 10022 (telephone 212-PL 2-6200). He wants to make a copy of the photograph and will return the original to its owner.

ARE YOU IN THIS PICTURE? These are the members and guests who attended the 58th Anniversary Banquet on December 1, 1967. Jack Poppele was the master of ceremonies and Fred Feldman of WOR put on a great audio-visual show.



MOBILE COMMUNICATIONS 1924

This mobile radio station was used as a part of Alfred Grebe's station WAHG during the early days of broadcasting. The LINCOLN carried a 50 watt transmitter, WGMU (the G for Grebe and the MU for Dr. Mu). The receiver installed in the BUICK coupe was owned by Ralph R. Batcher, design engineer for the Grebe Company at that time. The receiver is a three stage TRF type with a front end "tickler" to increase sensitivity, and operated from a four turn loop that surrounded the whole car.

This combination figured in many public events programs of WAHG—such as racing at Belmont and Jamaica tracks, polo matches, elections, and many of the fantastic stunts dreamed up by imaginative promoters of the time to help fill up the weekly Saturday radio supplements carried by metropolitan newspapers of that era to promote public interest in this "new" radio art. These included such items as the first-hand reporting of the siezure of rum-running boats, parades, fires, etc.

Dr. John Bertrand Johnson, discoverer of thermal (Johnson) noise, receiving the Armstrong Medal at the 58th anniversary celebration banquet of the Club on December 1, 1957. The presentation was made by Club President Harry Houck. At the far right is Jack Poppele, club vice president, who served as master of ceremonies.

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GUNTHER NEW ARMSTRONG FOUNDATION HEAD

Mr. Frank A Gunther, president of Radio Engineering Laboratories Division (REL) and executive vice president of the parent company, Dynamics Corporation of America (DCA) was recently elected president of the Armstrong Memorial Research Foundation which honors the memory of Major Edwin H. Armstrong. In addition to honoring his memory, the Foundation has the following purposes: to help perpetuate the principles that guided Major Armstrong in a life devoted to basic research in electronics; to aid the engineers and scientists capable of performing basic research in electronics and related fields of science.

To accomplish the above aims, the charter of the Foundation provides that it may: make grants of funds and property to Columbia University, particularly to the School of Engineering; award scholarships and fellowships to graduate and undergraduate students found worthy of assistance. The Foundation may also allocate funds or property to institutions, groups or persons not affiliated with Columbia University for educational and scientific purposes, including the preservation and commemoration of the inventions and research of Major Armstrong. Awards of these types are made yearly by the nonprofit organization.

RADIO OLD TIMERS COCKTAIL PARTY SET

On the evening of Thursday, June 13, a Radio Old Timers Cocktail Party will be held at the New York Hilton Hotel as part of the program of National Electronics Week.

NEW SARNOFF BOOK

McGraw-Hill has just announced the publication of "Looking Ahead: The Papers of David Sarnoff" which is priced at $9.95.

LETTERS TO THE EDITOR

Editor:

Your inclusion of George Clark's "A Christmas Story of Years, Towers and Oscillations" brought back a nostalgic flood of memories of a long, family friendship with George which began back in 1909. He was then the Navy's "Sub-inspector of Wireless Telegraphy" and I was first a wireless operator then operator in charge (at 20) at QL, later NAL, Washington Navy Yard. There I assisted in his tests of all new wireless equipment and eagerly absorbed his very helpful teachings of advanced theory and measurements, which were not given at the Navy's Brooklyn Yard Electrical School.

It was George who, with S. C. Harper, chief of Naval Communications, offered me the job of "Expert Radio Aide for Aeronautics" (Civil Service) when I left Purdue University to develop aircraft radio at Pensacola, Florida in 1916.

In later years when he was with RCA in New York City and I with my wife and two pre-teen daughters lived in Short Hills, New Jersey, he built a week-end retreat in near-by Flanders. This close proximity developed a strong family friendship.

Any one who really **knew** George felt a strong kinship with a many sided genius, technical, literate, philosophical. We never destroyed a single one of his letters, all gems of whimsical cleverness worthy of the "New Yorker", many too personal for public display.

I've just, out of curiousity, put a fat manila envelope on our kitchen scale: one and a half pounds of distilled George H. Clark. Many a time I've been tempted to induce someone to publish them for the benefit of all of those who knew him.

Although, at this distance from New York City we still get Christmas cards from his dear Alice. If ever you get down this way come and see George's jewels, maybe you'd like to use some.

73

Ben Miessner

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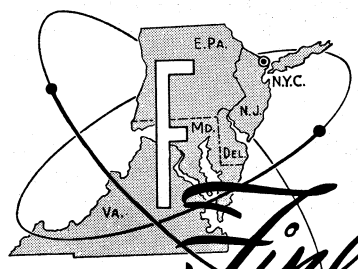

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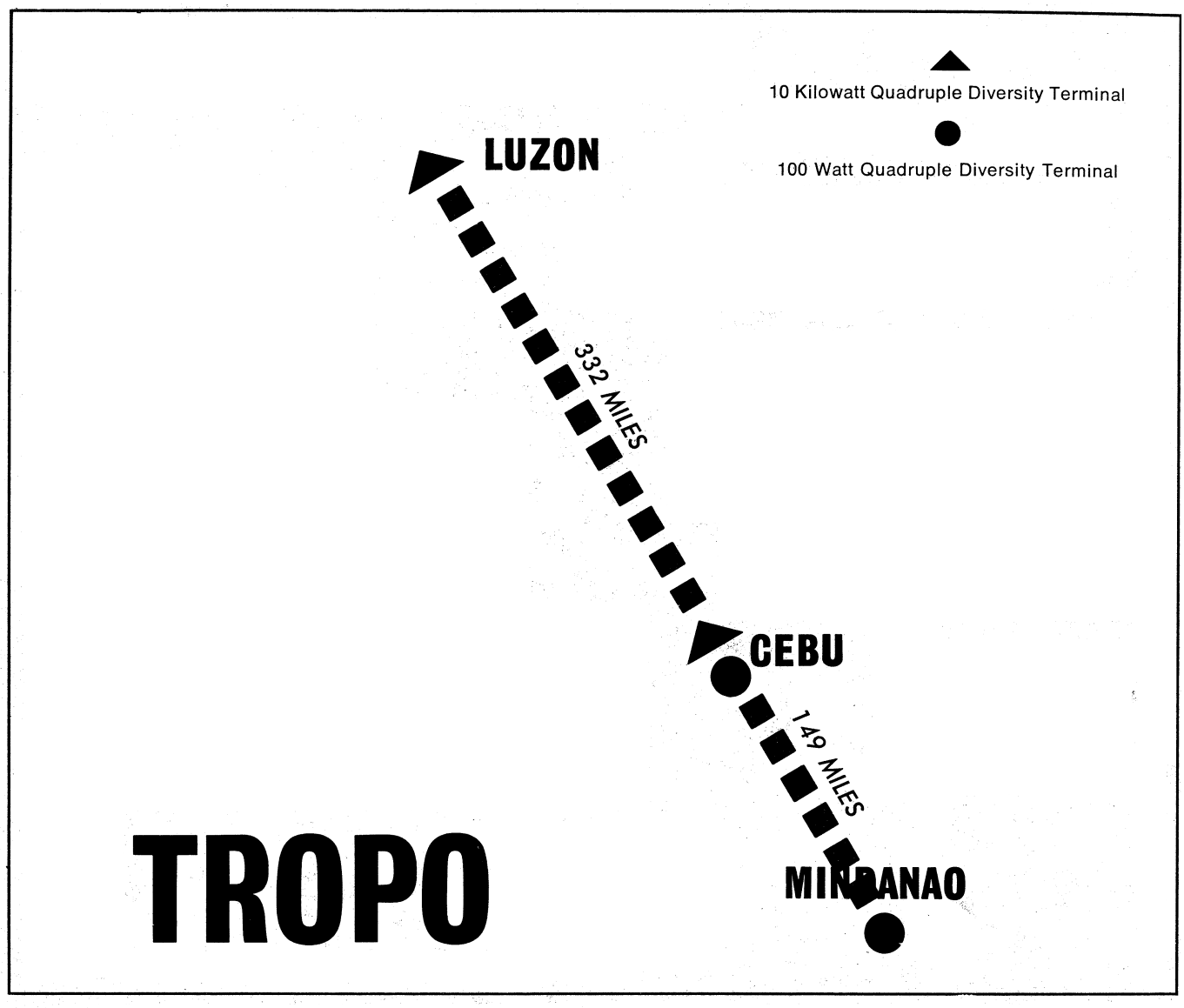

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Proceedings of

The Radio Club of America, Inc.

Volume 44, No. 2 Second Quarter 1968

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FCC & MOBILE RADIO SERVICES

FESSENDEN, FORGOTTEN PIONEER

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PROCEEDINGS OF THE RADIO CLUB OF AMERICA

Volume 44 Second Quarter 1968 No. 2

REGINALD A. FESSENDEN . . .

By Ormond Raby

Reginald Fessenden has been the victim of both the vast progress in science since his death and the almost total neglect of his compatriots. As a result, his work, instead of being recognized as perhaps the greatest contribution ever made to science by a Canadian, has been relegated to near oblivion.

In an editorial published shortly after his death in 1932, the NEW YORK HERALD TRIBUNE said:

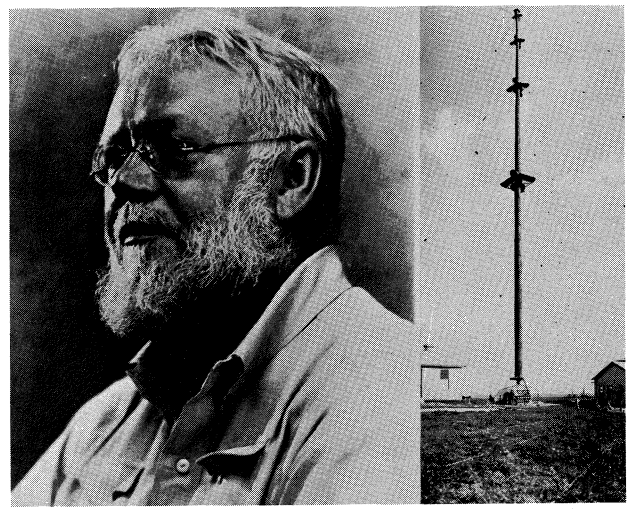
"It sometimes happens that one man can be right against the world. Professor Fessenden was that man. It was he who insisted, against the stormy protests of every recognized authority including Marconi, that what we now call radio was worked by continuous waves. The advancement of radio was retarded a decade by the failure of his contemporaries to grasp this essential. It is ironic that among the hundreds of thousands of radio engineers whose commonplaces of theory rest on what Fessenden fought for bitterly and alone only a handful realize that the battle ever happened."

Fessenden's whole life seems to have been a perpetual struggle, if not to restrain his prickly, headstrong disposition, then to man the ramparts in defense of his discoveries. The heterodyne, the liquid barreter, his perfection of the alternator, and more than 500 other inventions represented scientific conceptions so far ahead of his time that from the beginning they were coveted by certain areas of government and big business who were not impressed with the importance of paying him. Hardly a month passed without Fessenden being in court to protect his devices from the suits of others or in turn to sue those who were infringing him.

With Edison

But Fessenden could take care of himself. Born near Bolton, Quebec, a year before Confederation, the eldest of an itinerant Anglican minister's four sons, he had at an early age been forced to accept more than normal responsibility. During his final two years at Bishop's College in Lennoxville he was Mathematics Master and also taught Greek and French in addition to continuing his own studies.

The year 1886 saw Fessenden banging on the door of Edison's Llewellyn Park laboratories. Edison was the high priest of American invention and his laboratory was its shrine. He was not inclined to accept a young Canadian who was so stupid as to say in answer to the query, "What do you know about electricity?"—"Nothing, but I'm a pretty good mathematician and I can learn fast."



Left: Reginald A. Fessenden. Right: 400-ft. tower at Brant Rock, Mass, from which he sent voice and music in 1906.

After a month's persistent knocking Fessenden got on the payroll and before bankruptcy closed the laboratory three years later had become Edison's Chief Chemist. His first important discovery was made in answer to the inventor's request for a non-inflamable insulation which would be as elastic as rubber.

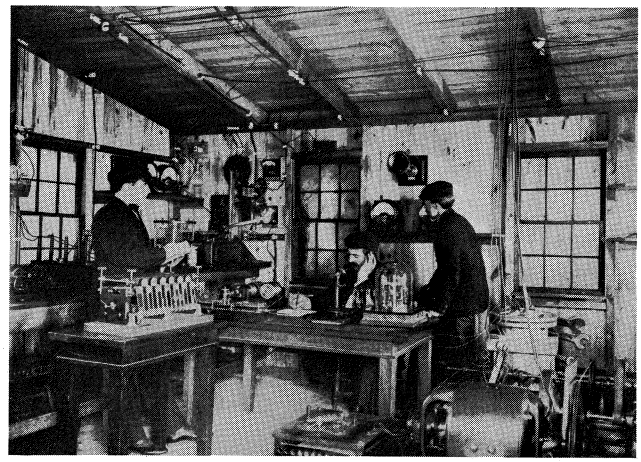
While with Edison, Fessenden became a follower of Hertz and soon began to develop his own ideas on the design of wireless apparatus. But he had such a poor opinion of the stability of the business world, three of his own employers having gone bankrupt, that he recoiled from the idea of attempting any commercial application of his work.

Teaching and Inventing

Never in the world's history has communications development been in a more tumultuous state than during the closing decade of the 19th century. Wild schemes abounded. Railway, telephone, and telegraph promoters, playing on man's overwhelming desire to commune with his fellows, drove up stock values one day and having stolen a good profit, let them collapse the next. Fessenden, still only 26, fled into the security of teaching, first at Purdue University and then as Head of the Department of Electrical Engineering at the University of Pittsburg. His application for the same position at McGill had been refused.

Pittsburg was an enlightened school and he took advantage of its extensive research facilities by involving himself and his brighter students in a multitude of experiments. Already he was dissatisfied with the slow acting coherer and was perfecting his own receiver, the

liquid barreter. It used a fine platinum wire about ten thousands of an inch in diameter immersed in nitric acid. The change of resistance was made by heating the liquid.



Fessenden's early radio station at Brant Rock, in 1905.

Fessenden became an inventor in the grand style of Edison—he didn't or couldn't confine himself to one narrow, set area of experimentation. Still at Pittsburg, he developed and patented one of the earliest forms of microphotography, a forerunner of that now in use. In his device microscopic photographic records were placed between transparent, fused quartz discs and were automatically projected in proper sequence on a screen.

The First Radiotelephone

The middle phase of his life began in 1900 with his decision to become a full time inventor. For two eventful years he worked for the United States Weather Bureau which was then exploring means of communicating forecasts from remote weather stations.

At Cobb Island, 60 miles down the Potomac from Washington, he tested his radio telephone between two masts fifty feet high and a mile apart. He used hot-wire barreters, ring receivers and an interrupter giving 10,000 breaks per second. The result, though not of good quality due to loud hissing caused by the spark's irregularity, has been hailed as the first transmission of intelligible speech by electromagnetic waves. Fessenden later described his invention of the wireless telephone to a meeting of the American Institute of Electrical Engineers at Atlantic City.

This was the same year that Willot, Chief Inspector of French telegraphs said: "Wireless signals are conducted through the earth not the air, the signals leaving at the bottom of the mast and not the top. Ether wave wireless will become obsolete and I will prove it so by sinking shafts in the ground."

In 1900 when Fessenden telegraphed 60 miles to Arlington, Virginia and in 1901 when Marconi transmitted the letter "S" from Poldhu to Signal Hill, some of the mystery surrounding wireless was dispelled. However one enigma, atmospheric absorption, would remain more than any other to bedevil all experimenters.

On Roanoke Island off the North Carolina coast it baffled Fessenden .He wrote his patent attorney, Wolcott: "I have been worried sick; the water down the sound over which we shoot our signals had thirty times the resistance as indicated earlier and sometimes during daylight only a 10th of one per cent of the energy transmitted gets through. But I'm now using the liquid barreter and have received musical notes from Hatteras using but three watts of energy. I can now telephone as far as I can telegraph, which is across the Atlantic ocean if desired."

Across the Atlantic

The opportunity to make good his boast came in 1903 when Fessenden joined two millionaires, Given and Walker, in forming the National Electric Signaling Company. He had quit the Weather Bureau when its Chief, Willis Moore, had told him, "Turn over part of your inventions to me or I'll see that the Bureau adopts Marconi's apparatus."

Nesco's headquarters was at Brant Rock near Boston and by 1906 Fessenden had erected identical 400 foot towers at the Rock and Machrihanish, Scotland. Then followed the great days of this momentous year when he beat Marconi at two-way trans-Atlantic telegraphy, became the first to transmit voice across the Atlantic and made the world's first radio broadcast.

On January 2nd Brant Rock reached the Scottish tower with the letter "D" repeated three times every ten seconds. Then on the 11th Machrihanish came through for the first time. Successful working continued until the summer heat increased absorption to the point where signals were not readable.

But by November, using new compressed air condensers and a steam driven, high frequency alternator of his own design giving one half kilowatt of wave radiation, he tested the telephone between Brant Rock and Plymouth, Massachusetts.

A few days later he was astonished to hear from the Machrihanish operators that they had overheard conversations between his assistant, Stein at Plymouth and the Brant Rock station. As he readied exhaustive tests for trans-Atlantic telephoning his hopes were dashed by news of the crashing of the Scottish tower.

The First Broadcast

He revived sufficiently from this numbing blow to telegraph ships of the United Fruit Company equipped with his system and steaming through the Caribbean, to be on the lookout for something new on Dec. 24th. Then he gave his memorable Christmas Eve broadcast. As he later said, "I gave a short speech to the startled operators then played a violin solo, **O, Holy Night.** Finally I read the Bible text **Glory to God in the Highest** and signed off by wishing them a Merry Christmas."

Of all the tasks that demanded attention at this time,

none gave Fessenden more satisfaction than his work as engineering adviser to the Ontario Power Commission. This study concerned the feasibility of bringing Niagara power to Toronto and southern Ontario. He was instrumental in adding the following self-explanatory paragraph to the Commission Report: "Your Commissioners do not hold the opinion that there is some radical, inherent defect in Canadians as compared with others that will foredoom to failure a civic enterprise such as that under consideration."

In 1905 the inventor had incorporated the Fessenden Wireless Telegraph Company of Canada, believing that trans-Atlantic working should not be left entirely in American and British hands. This incurred Given and Walker's displeasure and they fired him but not before he had established regular wireless transmission to New Orleans. Because of the 1600 mile overland route this was a distance feat which had previously been believed impossible.

World War I

At the start of the First World War he offered his services to Canada as a "Canadian citizen willing to serve in any capacity." During the war years he designed and constructed a host of submarine detection and signalling devices which played an important role in defeating German U-boats.

It was inevitable that Fessenden's work with underwater signalling apparatus would lead to one of his last inventions. In 1921 he filed his patent application for the fathometer and he lived to see its use on the great ocean liners of the day.

Operation of this device was continuous as the ship proceeded. An instrument on the bridge denoted the water's depth from information received via a hydrophone in the ship's keel. In 1929 Fessenden was awarded the Scientific American Gold Medal for the invention of the fathometer and his other sea-safety devices. Along with the Medal of Honor given by the Institute of Radio Engineers and the John Scott Medal, it gave him tangible proof that the significance of his work had been realized. The Scott Medal (Marie Curie had won it the year before) gave him the greatest satisfaction. It symbolized a final victory for Continuous Wave Reception.

An out-of-court settlement of 2½ million dollars verified the commercial value of his inventions. It was awarded him in 1928 in respect of his radio patents, including the heterodyne, and was paid by the Radio Trust after 17 years of savage litigation. He had been suing for 60 million. Embittered, but nonetheless happy in his new-found luxury, Fessenden spent the last four years of his life in Bermuda. During this time his most important experimenting was in television.

Little evidence remains to permit evaluation of these last experiments though the following remarks contained in an address to the Radio Institute in 1925 give some insight: "There is in existence to-day, fully developed and tested, a device of mine which I call the wireless pherescope and which is capable of putting vision into every house. I have developed it from the first crude apparatus of 1906. Its success depends on two inventions, the Multiple Valued Function Method and the shutter which has been operated to a frequency of 400,000 per second (Hz). I tendered it to the U.S. Navy in 1921, guaranteeing that it would work 500 miles. The Radio Trust, which controls my early patents, will neither put it on the market nor let others produce it."

Though nearly all his family had remained and taken roots in Canada, doctor's orders of sunshine and quiet had prevented Fessenden from spending the final days in the land of his birth. He died in Bermuda, July, 1932 and is buried there. On his memorial is engraved "By his genius distant lands converse and men sail unafraid upon the deep."

Canada's contribution to the development of radio communications was (and still is) larger than we often realize and Fessenden is an important part of the story. Unfortunately he has been overlooked by the history books and lost in the accounting of Canada's scientific heritage. A man who made the first two-way transatlantic contact on telegraphy, who was the first to transmit voice across the Atlantic, and who made the first radio broadcast should, we believe, be given better recognition.

One instance of the importance of Fessenden's discoveries is in the word 'heterodyne.' It's a common enough technical term and you can't get far in radio theory without having to understand the principle involved. Fessenden was the first to describe this principle and heterodyne is his word. A New York judge had this to say about it in 1917 during one of Fessenden's numerous patent fights:

> "These patents concern the beats system of radio signalling, or more expertly the heterodyne . . . a name created by Fessenden. By his Patent No. 706740, granted August 13, 1902, he made a new contribution to the knowledge of the time for nowhere and by no one had there been even a suggestion of the application of the beats system to radio. There can be no doubt but that Fessenden accomplished world invention of a high order."

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RADIO CLUB OFFICES MOVED AGAIN

The Club offices have been moved to larger quarters in the same building: from Room 604 to Room 319 at 250 Park Avenue in New York City.

Rosel H. Hyde

FCC EFFORTS TO IMPROVE LAND MOBILE RADIO SERVICES*

By Rosel H. Hyde
Chairman, Federal Communications Commission

Efforts of the Federal Communications Commission to improve land mobile radio services is a particularly timely subject. As most of you know, the Advisory Committee for the Land Mobile Radio Services has filed with the Commission its final report. The report of some 800 pages is the result of over three years of labor by those individuals most knowledgeable in the field of land mobile communications, including land mobile users, user groups, equipment manufacturers and engineers. This committee explored in depth the possible avenues for making better and more efficient use of the spectrum presently allocated to the land mobile service. It was indeed a herculean effort for which we are all most grateful.

The conclusion of this distinguished committee which, as you know, was chaired by Commissioner Cox, graphically describes the problem that confronts us today, and I quote:

> *At the present time over two and one-half million transmitters are packed into only 4.7% of that portion of the spectrum considered useful for land mobile communications. Licenses for new transmitters are being requested at the rate of about 15,000 transmitters a month.*
>
> *Although adoption of the recommendations of the Advisory Committee will result in a small degree of improvement in spectrum utilization, it will not provide the relief to the land mobile congestion problem that is necessary to assure continued benefits to the public which can be provided only by land mobile radio. Genuine relief, which is needed immediately, can only be achieved by the allocation of additional frequency spectrum to these services.*

Let me reiterate at the outset the commitment I made on behalf of the Commission at the time we met to receive this report.

First, the Commission will give high priority to studying the recommendations in the report which look to the more efficient and effective use of frequencies already assigned to these services. Indeed, some of the recommendations have already been implemented or are in the process of being implemented.

Second, we will also give high priority to finding additional frequencies for the land mobile services. Our current budget contains funds for this purpose and our Chief Engineer's Office and Safety & Special Radio Services Bureau are already well advanced in their studies.

Land mobile frequency congestion, especially in the larger metropolitan areas, is becoming most serious and is cause for deep concern. It seems reasonably clear that the problem must be attacked on two fronts —immediate relief is needed in order that the usefulness of these vital services to existing licensees not be jeopardized nor would-be users denied access because of the lack of usable frequencies. As for the long-term solution, it seems evident that additional spectrum space must be provided to meet the continued growth demand.

The principal hope for the immediate future lies in finding ways to make more effective use of the spectrum now allocated. We have had some success in this area with the reduction of channel spacing to achieve additional usable channels. We are hopeful that our latest efforts involving a reduction in channel widths in the 450 to 470 MHz band from 50 KHz to 25 KHz will also aid in alleviating the immediate problem.

MORE PRECISE STANDARDS NEEDED

Another area which must be explored is that of more precise engineering standards in system design. It is now mandatory that we design these systems to permit the maximum possible number of assignments. Through more careful control of transmitter power, antenna height, antenna configuration, on-the-air time, etc., some further relief can be obtained.

We must also seek improved assignment procedures, such as the recommendations that have been made for more extensive inter-service sharing.

There are no easy answers. We will have to "keep at it" if we are to find the answers that must be found. In some areas we have only scratched the surface in our effort to achieve both short and long range programs.

I have already alluded to our proceeding which looks toward channel splitting in all of the 450-470 MHz region except for those portions used by Remote Pickup Broadcasting and the Domestic Public Radio Service. Similar "splits" in these other two services are also contemplated in separate proceedings. We must

strive to make these newly created channels assignable and usable in the very shortest possible time consistent with an orderly transition period.

Apportionment of the new channels among the various services is, of course, a critical step in the proceeding. We are proposing some substantial departures from the classic "block allocation" principle in an effort to provide the highest possible yield in terms of efficiency of utilization. Some concern has been expressed with respect to some of the innovations we have proposed. We will carefully consider all comments and where warranted and in line with our overall objectives necessary adjustments will be made.

SHARING VHF TV CHANNELS

Let me now turn to the feasibility of sharing VHF TV channels. The Commission began its inquiry into the possibility in March 1964. Although there were a large number of comments in the proceeding, the principal filings were made by the Land Mobile Group of the EIA and representatives of the television industry, notably the Association of Maximum Service Telecasters (AMST). Not totally unexpected, these filings reached completely contradictory conclusions as to the feasibility of sharing between VHF TV and land mobile. Part of our efforts to explore the divergencies led to the formation of a Commission-Industry task force whose principal charge was to conduct a series of field tests in an effort to obtain more technical and factual information on the feasibility of sharing. The group is headed by a steering committee made up of government-industry representatives, and under their direction a land mobile operation was established, first in Wheaton, Maryland, and later near Fredericksburg, Virginia, and Lancaster, Pennsylvania.

In the months that followed, a number of additional test sites were included in this rather elaborate data gathering project involving operation of a land mobile base station on Channel 6. The last phase of these tests, at least in the Washington area, was concluded in October 1967. Data obtained are now being processed and analyzed by computer methods. The next step will be consideration of the results and recommendations of the steering committee.

It is not possible to predict the outcome of this ambitious project, but it will provide us with necessary information to determine whether and under what ground rules land mobile sharing of VHF TV channels is feasible. A very interesting disclosure brought to light during the test is that of interference by land mobile units to wired distribution systems. It would indeed be ironic if we find that wired TV systems are pre-empting spectrum space allocated for radio systems.

POSSIBILITIES IN THE UHF

One of the most important efforts being made in the interests of land mobile frequency relief is the Commission's undertaking of a wide-range, intensified examination of the possible use of UHF TV channels. This includes sharing, reallocation of a portion of these bands to the Land Mobile Services, or perhaps some combination of the two. A steering committee of key Commission personnel under the chairmanship of our chief engineer, Ralph Renton, has been formed and is charged with the responsibility for investigating the following areas:

(1) The possibility of meeting land mobile frequency relief requirements in the upper portion of the UHF TV band (Channels 70-83) from 806-890 MHz.
(2) Geographic sharing of UHF TV channels in areas where they are unassigned.
(3) Reallocation of the lower 4 to 7 UHF TV channels (14 thru 20) to the Land Mobile Service.

From many viewpoints, reallocation of a few TV channels at the top of the UHF TV band is to be preferred over the other possibilities. In this portion of the band, aside from translators, there are at present only two TV station assignments. Reallocation in these bands could be accomplished without material disruption of established TV services. On the other hand, we are aware that you view space in this portion of the spectrum as of doubtful value.

NEW DEVELOPMENTS NEEDED

Of course you are right when you note that land mobile equipment for this portion of the spectrum is not readily available and, indeed, in many instances must be developed. The anticipated limited range, particularly of mobile transmitters, will also require different system designs from those with which we are now familiar. While recognizing these concerns, we must not necessarily accept them as insurmountable obstacles to the ultimate employment of these or other higher frequencies for mobile communication requirements. Unquestionably the lower end of the UHF TV band would be more desirable for land mobile operations at this time. But we have many precedents for believing that advancements in technology, improvements in equipment, improved systems, and the economies of mass production can eventually overcome the problems of higher frequencies. In any event, relief from this source must be regarded as in the long-range area.

Our study in the field of geographic sharing of UHF channels with land mobile radio indicates that this is an encouraging area where there is much greater latitude than on the VHF side. Our study is well along and a final report is in the hands of the committee chairman. I understand that the report indicates the possibility that some relief could be provided in a number of metropolitan areas, including New York City.

In our wide-ranging effort, we are, of course, studying the possible allocation of channels at the lower end of the UHF TV band. Here, as I have indicated, we do face squarely the question of providing appro-

priate new operating assignment for a substantial number of stations already broadcasting or under construction.

We know from experience that the most difficult assignment areas are those in which there are many large cities, such as Chicago, Boston, and Washington. In the interest of expediting the study and on the theory that any plan that will meet the requirements of these areas can be adapted to most of the rest of the Nation, the initial phase of the study is being conducted in the areas indicated.

PART OF OUR DAILY LIVES

The Commission is committed to find solutions to your problems. We are aware of your importance and your contributions to our economic and social well being. As the Advisory Committee's report so aptly stated:

> *Land mobile radio has become a part of almost every facet of our daily lives. It gets the taxi to our door, the doctor to our bedside, the furnace man to the basement when there is no heat. It plays a key role in the war on crime, enables firemen to communicate from inside burning buildings to the main force outside, is at the heart of the fight against air pollution and has saved the lives of our school children whose buses have been marooned in blizzards. Because it does perform such valuable services, its use has grown tremendously in recent years.*

In this connection it is reliably estimated that by 1975 there will be over 5,000,000 transmitters in these services.

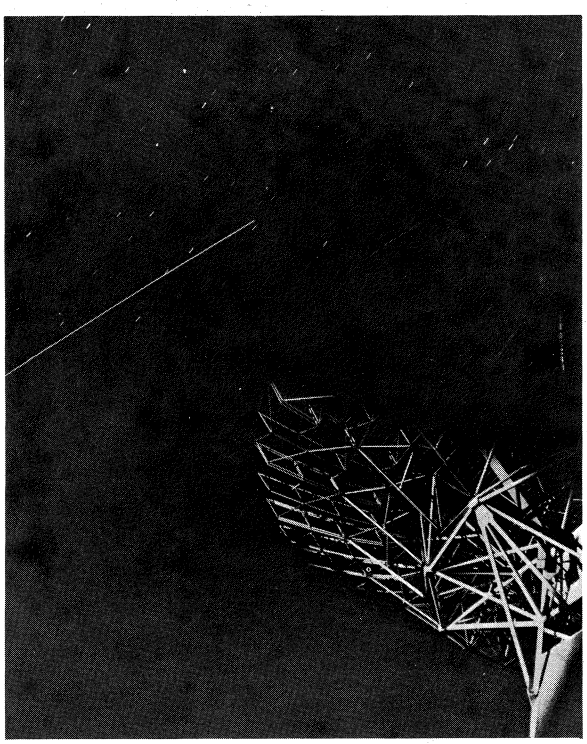
I have only touched on a few of the many proposals that are receiving our earnest attention. Those I have singled out are enough to indicate the magnitude of the problem and our determination to provide usable channels and adequate spectrum space to our vital land mobile services at the earliest practicable date.

*Address by Chairman Hyde at the annual banquet of the IEEE Vehicular Conference on December 7, 1967 at the New York Hilton Hotel.

ECHO'S END NEAR

An aging space traveler whose comings and goings are watched daily by thousands of people will soon return to earth.

The Echo I satellite, a ten-story high sphere at its birth, was the world's first communications satellite. Now, nearly eight years after its launch on Aug. 12, 1960, Echo's silvered plastic surface is riddled with holes from micrometeorites and it floats in a formless mass through space.



Echo I satellite ,visible to naked eye as bright, fast-moving star, streaks across heavens over Bell Telephone Laboratories' "dish" antenna at Holmdel, N. J. The 60-foot antenna was used in the first space communication experiments during 1960.

Each day the satellite drops lower, and scientists at Bell Telephone Laboratories who conducted the first space communications experiments with the NASA satellite and still occasionally track it with their antennas, agree with space tracking experts that it will not last another month. It is now at an average altitude of 550 miles and is travelling about 17,000 miles an hour. Experts are not sure whether it will burn on entering the atmosphere or float down like a parachute.

Soon after Echo's launch millions of persons around the world stood at dawn and twilight to watch it streak across the sky. Newspapers carried the daily schedule of Echo's passing along with the times of tides, sunrise and sunset—and many still do. In New York City a telephone call would bring you a schedule of its daily passage. Today it still provides scientists with valuable information about the effects of solar wind and air drag.

Echo's career as an experimental communications satellite was short but exciting. The first signal sent through space was a taped message by former President Eisenhower. It was sent from the Jet Propulsion Laboratory's Goldstone, California station, bounced off the aluminum coated plastic sphere and then picked up by the Bell Labs horn antenna at Holmdel, New Jersey.

The following day, the first spaceborne two-way telephone conversation took place between Bill Jakes, the Bell Labs Project Engineer, and Phil Tardani of Jet Propulsion Laboratory. Later experiments clearly demonstrated that satellites could be used to transmit

two way voice broadcasts, facsimile photographs, and data messages.

Echo bridged the Atlantic twice with signals sent from Bell Labs in Holmdel to Jodrell Bank, England, and Issy Le Molineaux, France.

These feats were accomplished even though Echo was the most electrically unsophisticated satellite ever launched. Sensitive ground equipment made up for the simplicity of the satellite. Echo was 100 feet in diameter, but when it was 1000 miles away from the tracking antennas it was equivalent in size to a golf ball at one mile. After reflection from the balloon the signal collected by the receiving antenna was a hundredth of a millionth of a millionth of a watt. To build signal power, Bell Labs developed the most sensitive radio receiver that had ever been built. Today, similar receivers are used to track spacecraft millions of miles in space.

The idea of a communications satellite such as Echo was conceived long before the space age. In 1955, John R. Pierce of Bell Labs, proposed a 100-foot-spherical "passive" satellite that would reflect strong radio waves.

The Echo project got underway in the spring of 1959, under the sponsorship of the National Aeronautics and Space Administration with Bell Labs and Jet Propulsion Laboratory as principal participants.

After the Echo project proved the feasibility of satellite communications, the Bell System proceeded on its own to develop the TELSTAR® communications satellite—which did not merely reflect signals, it actually received and retransmitted them.

Launched in 1962, the TELSTAR Satellite proved that complex spaceborne communication systems were possible. In the same year Congress passed a bill authorizing establishment of the Communications Satellite Corporation for the purpose of creating a commercial communications satellite system. Today, calls across the Atlantic and Pacific oceans are made routinely by satellite.

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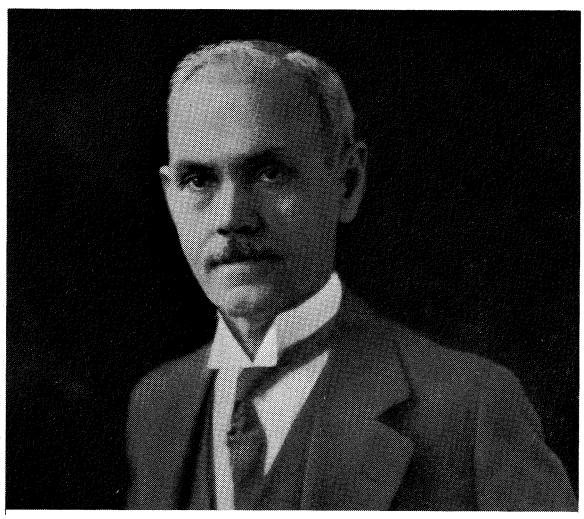
THE HAMMARLUND STORY

Many old highly respected names, such as Packard and Kilbourne & Clark, have disappeared. But, the highly revered HAMMARLUND name, which has had its ups and downs, will undoubtedly become even more well known as a result of its recent acquisition by Electronic Assistance Corporation from Giannini Scientific Corporation.

Since many of the members of The Radio Club of America are interested in radio history, this article is presented here. It is an edited version of a summary of the company's history written by the late Austin Lescaboura.



Oscar Hammarlund

In about 1925 the company moved to 424 West 33rd Street, where the first Hammarlund-Roberts radio kits were built. These kits, designed for broadcast listening by experimenters, incorporated capacitors, coils, and other items manufactured in the plant.

In the same year the famous Midline variable condenser, an innovation designed by Oscar Hammarlund and his son Lloyd, was developed as the only practical solution to the tuning problem, and is now standard in nearly all home receivers. By 1931 three outstanding broadcast receivers—the Hi-Q-29, Hi-Q-30, and Hi-Q-31 were among the finest home-constructed receivers on the market. Some are still in use today.

The Comet-Pro, the first commercial shortwave superheterodyne, a Hammarlund pioneered product, was just undergoing final engineering touches in 1931. By 1936 the Comet-Pro was in use by the thousands all over the world by commercial operators, in broadcast stations, and by leading amateurs. All the important exploring expeditions included it as part of their standard gear. Early in 1936 the first "Super-Pro" was introduced after over four years of engineering.

The company's "Super-Pro 600" receiver is still in use by governmental, military, and commercial groups all over the world and has attained an outstanding reputation of which the company is justifiably proud.

Because Hammarlund had specialized in high precision capacitors for use in commercial and military equipment, nearly 90 per cent of this nation's electronic war equipment in 1941 employed Hammarlund capacitors. Thousands of Hammarlund communications receivers were used on all the battle fronts by the Army, Navy, and Air Corps during World War II. Many other military electronic products were designed and built in the company laboratories and factory, some of which more than ten years later were still in the "secret" category.

Later the company moved and occupied four floors of the huge 460 W. 34th Street Building, with additional space in nearby structures, plus a newly completed plant at Mars Hill, near Asheville, N. C. Still later, the company moved its general offices to 53 West 23rd Street, and in 1964 to Mars Hill.

The magnificent tradition of Oscar Hammarlund was carried forward by Lloyd A. Hammarlund, who served as president, and by Martin Koenigsberg and Stuart F. Meyer (Fellow of The Radio Club of America) who later served in that post.

In 1882, the words "radio" and "electronics" were practically meaningless if not unknown. Men who spoke of sending signals through the air were considered either dreamers or madmen. Yet it was in 1882 that the Hammarlund story really began.

It was in 1882 that a young man arrived in the United States from Stockholm, Sweden. His name was Oscar Hammarlund. He was 22 years old. In Sweden, he had been a special tool designer and inspector of electrical instruments for the L. M. Erickson Company, leading instrument manufacturers and originators of the French-type telephone. He came to this country to accept a similar position with the Elgin Watch Company.

After four years with Elgin, he joined the Western Electric Company as superintendent of the Chicago plant. Six years later he became design engineer and plant superintendent of the Gray National TelAutograph Company (now known as TelAutograph Corporation) working closely with the founder, Elisha Gray, who is known as a co-inventor of the telephone.

This team of Gray and Hammarlund, was responsible for the development of the TelAutograph, a revolutionary machine which astounded the world. For here, for the first time, writing was transmitted by electric wire. Among the many Hammarlund features built into the machine was the stylus, which resembled our present-day "automatic" pencil.

In his eighteen-year association with Elisha Gray, Oscar Hammarlund was able to follow closely the early

history and development of his first love—radio. Finally, so keen were his interests in "wireless," that in 1910, he decided to organize a company for the purpose of developing his own ideas.

The company was originally located in a loft on Fulton Street in Manhattan. In order to operate and pay the skilled help, it built a seemingly wierd assortment of products. It was not until 1919, when broadcasting first started, that Oscar Hammarlund had an apportunity to put to practical use the results of his many early experiments. It was during these days, before most of today's radio and electronics manufacturers even existed, that every wireless enthusiast and dabbler in electricity knew of Hammarlund. Amateurs and experimenters turned to the organization for many of their requirements.

Joseph Klein, who was later in charge of the model shop, said that when he joined the company in 1919 at the Fulton Street shop, one of its more complex pieces of equipment, the Armagraph, was in manufacture. This phonograph-type piece of equipment, made up of a rotating disk in which notches were cut and over which glided a platinum tip contact, was used to train amateur radio operators in Morse code. As the disk rotated and the needle hit each one of the holes, it produced the sound of a dot or dash.

The first Hammarlund capacitor was developed in 1916, not as a product for a specific electronic application, but as a machined item for an experimenter who furnished the plans.

In 1920 the company moved up to 18th Street where about 50 persons were employed. In the 20's the company manufactured thousands of Western Union call-boxes. These small fixtures were installed in nearly every business office. When a company executive wanted to telegraph a message, a turn of the crank on the call-box would send a code signal to the nearest Western Union office. A boy would be sent over immediately to pick up the message.

There were also double-throw knife switches that were manufactured as well as "cordless table jacks" for telephone systems, all of which marked the beginning of the definite swing to electrical and electronic products.

BOOK REVIEW

"ELECTRONICS IN THE WEST. **The first fifty years.**" by Jane Morgan, published by National Press Books, 850 Hansen Way, Palo Alto, California. (94304) ($4.95)

A most interesting presentation of the experiences encountered by radio experimenters operating "way back when" who did at least some of their work in the west, mainly around the San Francisco Bay area. It will bring back many memories to members of the Radio Club and others who started in the field a few decades ago. Its "Algerish" style tells of the imaginations, curiosity and perseverance of many pioneers, which will make it interesting to youngsters as well. It is a recommended addition to any radio library. The anecdotes that intersperse the reports of accomplishments of men who have made a name for themselves make for very interesting reading, for all of us have gone through experiences of like nature, even if we did not succeed in becoming as well known.

The locale **"in the west"** is just a broad stake, since few early radio experts stayed put for any length of time, and migration was generally toward the east then, before its reversal after W.W. II. The concept however is a good one, and this reviewer wishes that others would come out with additional books to cover the activities of others. There is enough material around for a whole series.

The material cited is authentic as to the anecdotal aspects, but the purely technical aspects do not delve deeply enough to be a historical reference source (as to **who** did **what** first, and **why** and **when**) that would provide meat for the ultracynical. The material was gleaned from interviews with contemporaries and associates, and from study of material held at the Foothills Electronic Museum (which contains the Perham collection), with which the author is active.

As mentioned, the coverage is not strictly geographic, but one wonders about the omission of so many names of early authorities that we regarded as western pioneers—Frank Rieber, Lewis Clement, Nathaniel Baldwin, Bob Marriott, Ellery Stone, Oscar Roos, Melville Eastham, and others, as well as reports on some of the many west coast manufacturers of yester-year who were the thorns in the side of eastern concerns who were "admitting" that they alone were responsible for all progress! Members of the Radio Club will find the book of great interest, I am sure. Incidentally, a number of our members are mentioned therein—Haraden Pratt, Lloyd Espenschied, Archie Stevens, Frank Marx, Richard Ranger, and others. It would make an excellent gift to youngsters just getting started. In appreciation I suggest that the Club send a couple of copies of the 50th Anniversary book to the author for her use and for deposit in the Foothills Museum.

Ralph R. Batcher, reviewer.

The IEEE SPECTRUM for June 1968 carries a most interesting story about Robert Marriott, who was long a member of the Club and one of its Honorary Members, condensed from his own autobiographical notes, by Haraden Pratt. By all means read it.

THIS WAS THE NEWEST, NEW CENTURY THRILL

By John O. Ashton*

This was the newest, new century's thrill
When Wireless was a playtoy still
There was a lad, we knew him well,
Whose escapades we'd dare to tell.
We're old enough to see the humor
To tell the facts, ignoring rumor
Perhaps we'd like the reason thus:
Let's view the past as others saw us
So, in line with our reflection,
We'll view my life in introspection.
Harking back to naught-one wireless
Tinkering through the long nights tireless
Through frigid spells, devoid of static
Listening for those "Sigs" erratic
While huddled up in heatless shacks
Cold winds blowing through the cracks
Singing, they lent a cheerful note
Out there atop that hill remote.
Intent we listened for our call
To oscillate the Etheric Wall
When it came in friendly Morse
We pencilled copy word-for-word.
Atop our shack was a maze of wires
Spreading wide on pole-like spires
Our crashing sparks, purple, royal,
Shook the floor, that Rhumkorff Coil
Creating rare old ozone smell
That older "hams" remember well
The giant coils, the jar condensers
On any wave, there were no censors
Our Ether then was free and wide
As pioneer "Hams" worked with pride
Spelling out in dots and dashes
Listening in between the crashes
Reaching out, never doubting
That we'd find an aerial routing
Testing then our gadgets crude
Of that new component brood
Trying out our crude detectors
Listening through the distant sectors
Across the seas that hide Atlantis
WIRELESS first was born Gigantus.
So, we pioneered, played our part
Helped to found the "wireless art"
At first the signals, faint, were heard
Receivers were so ancient, quaint
We used those old "electrolytics"
Amusing now to modern critics,
who never knew our crude detectors
which we used as keen inspectors
Turning "up" or "down" or "try"
To get those weaker signals by
Listening with a straining ear
Tuning in our latest gear
Setting Wollaston-Platinum wire
Emersed in nitric acid, fire
"Setting", waiting so patiently
For those "sigs" from "cross the sea"
Until one day, when M.B.D.
Marconi "sigs" came clear and free
"Old Pioneer Wireless Station One"
Was "WNQ" a testing run
Erected by Marconi's hand.
At Yonkers-on-the-Hudsonland
To test his kites, his toylike rig
Trying to hear a distant "sig"
In Nineteen-One, a stormy day
Weather "sharp", skies, all gray
When in the P.M. watch near three
Uncle and I listened, across the sea
To those signals "S" in Morse.
Faint at first, then loud and coarse
While Marconi, Kemp and Paget heard
What many said was "quite absurd"
But true to fact in Newfoundland
Came signals—"Twenty thousand band"
Marconi did it—turned the tables
Against the rival—slower cables
In pioneer days—of one November
A cold reception—one may remember?
A genius thrived in the Science Age
His exploits covered many a page
His New York Lab was luminescent
Weirdly lighted—the first fluorescent
This AC founder—noted mentor
Was Nikola Tesla; "The Great Inventor"
Found the "Ray" called "X" by mention
Some seven years before Roentgen
Calling it "My Special Rays"
Then Cosmic Rays—in later days
Twenty years before Millikan knew
He'd rediscovered old "Tesla's Brew"
Tesla made the Robot Missile.
His ideas first made rivals bristle
Because this genius-pioneer
Was profligate without a peer
And pirated by rivals many
Who cheated him without a penny
Still today he's little known

Pioneer pilot with Marines in A. E. F., De Forest Audion salesman, and now a real estate broker in Santa Cruz, Calif.

This great discoverer who had sown.

So much seed in new ideas
He started men on rich careers
Who later shunned their benefactor
Called him "Nick The Tinkering Actor"
But we remember and with wonder
These Tesla sparks and crackling thunders.

Out in Jersey's Menlo Park
Through toiling hours, after dark
Edison, we called him "Uncle Tom"
Insomniac, enthused and calm
With tables, shelves, Sunday gear
Smelly chemicals always near
This Wizard Man was often gay
Enjoying pranks he liked to play
And when results by chance were sound
His puckish glee—it knew no bound.

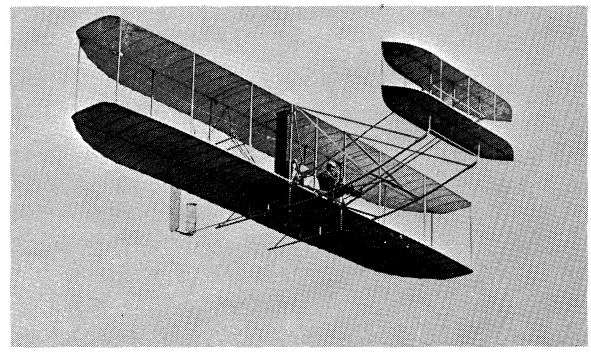
The pioneer men of Radio grew
Smart, resourceful, all too few
But one of those a worthy seer
Carving out his wide career
Was "Fussy" Fassenden, quite pedantic
First to talk across Atlantic
His alternator, the first great one
Was copied by a rival "son"
We used to ask the reason why?
For all this "try" and "try"
Until this pioneer would say:
"Would, that I were a boy today
Filled with queries, so inquisitive
To find new things—a new derivative".

In Yonkers-Up-in-Greystone-Tower
Crude and cold was Armstrong's bower
Up all night till come the light
Testing out his circuits, right
"Signals steady" from old Glace Bay
Or Polduland across the sea
Using aerial wires from "N.Q." site
That Marconi'd found "all right"
So was financed his "Patents Pend"
The newest wireless "Feed-back" trend

We did not know that pioneer "Lee"
Had made that great discovery
For in that day of rivalry
There was no "Print" no I.R.E.
Published claims were very rare
With few to bother or to care
While pioneers were earnest, eager
Royalties then, were all too meager.

Can you remember before '15?
When wireless was a sport so clean
When poor boys or the millionaire
Shared the wireless for fun or dare
In that day of the Coffio-transformer
The gap—the spark—the noise performer
With Leyden Jars all neat in a row
Under purple spitting sparks aglow

ELMO PICKERILL
Holder of Wireless License No. 1



Orville Wright flying in 1909. In this plane, or one like it, Elmo Pickerill made his historic first radio flight.

Elmo N. Pickerill, 82, died of an apparent heart attack in the waiting room of the Long Island Rail Road station in Mineola on January 14, 1968.

"Pick," as he was called by his friends, was one of the early barnstormers, flying in exhibitions over much of North and South America.

In 1904 and 1905 he worked with DeForest and Marconi in their experiments with "wireless." Mr. Pickerill made the first air-to-ground contact on Aug. 4, 1910 with a compact transmitter and receiver that he built. This solo flight from Mineola, N.Y. to Manhattan Beach, Brooklyn and back was accomplished with but seven hours of flight instruction from Wilbur Wright.

He became chief pilot for the Radio Corporation of America after World War I, retiring from RCA in 1950.

Some will remember Elmo Pickerill as a former officer of the Long Island Early Flyer's Club, from the Early Birds of Aviation or as president (in the New York wing of the OX-5 Club for early flyers) of the Veteran Wireless Operators Association.

The aerial switch in front—on wall
You "slammed her tight" to start a call
As old "D.F." or "H.A." Bland
Answered calls on "600" band
When "Champagne Morse" tripped off by a peer
Of the Royal Family of Pioneer Key Men**
This was a day when all were free men
When "Ops" of that grand fraternity
Were proud of a pioneer paternity
Before the Continental Code Invasion
Of the sluggish drone persuasion
Air lines cluttered with dash-long "sigs"
Like grunts and groans from clumsy rigs.

Came World War I—off to France
Flying the lines—we took a chance
With crudest gear—direction finders
Flying low in our "Coffee Grinders"
We flew above the German military
Spotting targets for artillery

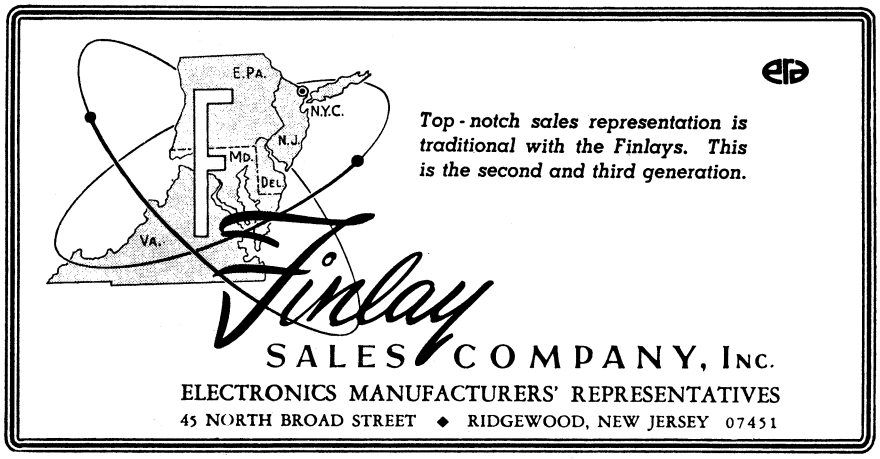
***Pickerill, Duffy, Thurston, Vosburg, Quigley*

CLUB NEWS

Club member Bruce Kelley, who gave us the memorable banquet highlight in 1966, is again at it, promoting a Radio Historical Conference at the Smithsonian in Washington on October 4-5-6, 1968. There will be three days of nostalgic information. This Conference is an annual affair conducted by the Antique Wireless Association of Holcomb, New York. Non-members are invited. Send a self-addressed, stamped envelope for details. The advance program looks mighty interesting. Lloyd Espenschield will be the guest of honor, and Haraden Pratt, William Harrigan and Ralph Batcher, from among the Club Members, will be on the program.

The Club Proceedings will devote a page (or several if needed) toward letting others know what you are up to! Reports on your present connections, your hobbies, extra-curricular technical activities, inventions and the like will be mentioned on these pages if you tell us. We know of some experiments being carried on by some of our retirees; that would make fine reading. Keep in mind that you DO NOT have to present a paper to make these pages. We want to promote the "Club" activities as never before. We find hundreds of highly sophisticated articles that get printed monthly, most of the material being over our heads. However, the spirit of experimentation is still rampant among many of our members, so drop us a note. If you get articles published elsewhere, let ye editor know.

Plans are under way to interest groups of members residing in other areas to have at least one meeting a year—even a picnic. We find some areas have many members permanently located there—in Florida, Chicago, California, etc. Write in for help if you want to look into these matters, and get a list of other members in your area.



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In our "Snipes" and "Sopwith Camels"
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Slow and clumsy pioneers flew
without a "Chute" or any crew
So any landings we called "Good"
If we could walk from the field or wood
We flying men were fatalistic
Said to be our characteristic.

In that day "le Boche" or "Hainie"
Shooting down, afire and shiny
We made a fetish of our testing
New and clever ways suggesting
Building, tinkering all the time
Trying radio, so prime
Then Lusian Levy and Armstrong came
Pioneered in their FM fame.

We back in civies, sailing seas
Tropics, Arctic, foreign leas
Long spent voyages port-to-port
Pioneering in waves called "Short"
Teaming up with Marconi's Yacht
Sailing 'round the world, our lot
Fun it was to pioneer
To test the new and latest gear.
Of freak sigs "from distance skip"
Pioneering this short wave trip
As we talked around the world
Through the hours and "DX" hunts
A pioneer thrill in life, just once
From frigid seas to tropics hot
Into the discard what hefty power
No more "DX" distance, "Sour"
Thus it was that "G" Marconi
His short wave first—one and only
One who adored, making wireless
Eat up space—A World Empireless.

With Lee de Forest full of notion
His genius fired, with satisfaction
Of making progress in Audion art
Under his watchful eye, our start
Lee was first in field to sell
The fruit of this pioneer well
Proving his tube that he invented
Couldn't be just circumvented
By a prior but faulty claim
"Made in Britain", Fleming's name
To demonstrate de Forest's find
Required a steady selling grind
The crystal era we thought "dead"
With commercial wireless onward led
A new and wider distance range
"Ops" now toiled with new persistance
Converting those still full of doubt
Who often laughed-put the route
Pioneers who made their claim
But later on were Men of Fame.

It was then our pioneer pride
We showed the "Audion", newest guide
For engineers it was a pity
Our claims were so disbelieved
This Audion was the latest thing
But some old timers had to cling
To old crystals and their tricky finders
Some even had the Magic Winders.

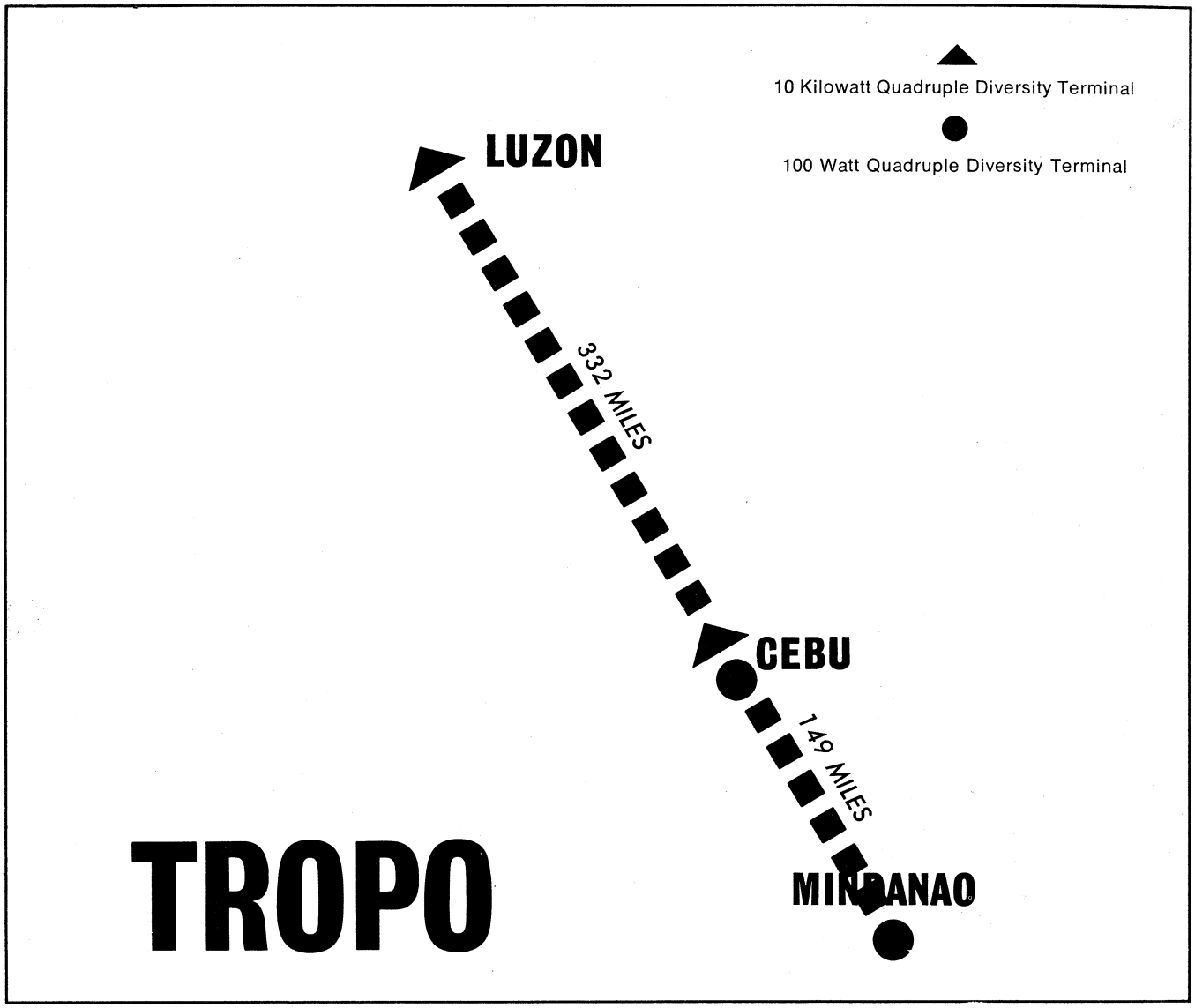
These old "die-hands" of older stuff
Announced our claims, "just a bluff"
So we faced the Providence jail
Old John Shephard in our trail
This Yankee merchant couldn't see
"That little tubes", it just can't be
The Heart of Wireless sets, said he
"This is" he said, "an impossible dare
To pick these signals from out the air"
To Shephard our Audion was "Just a fake"
He for one no chance would take

So we faced the Judge
Publicly he shouted "He's a fool
Who claims this little tube, a tool
To hear the signals from out of space
Those tiny wires in that glass vase"
The Yankee judge stared and frowned
Suddenly he looked profound
Remarked he's heard lots of cases
But this one he thought had traces
Of a genius that he knew
Existed with a Wireless few
He banged his gavel, spoke more low
Said "Case dismissed, You can go"
Now Mr. "A" you Audion man".
Take heed I've seen some wonders work.

There as a "ham" I used to lurk
I say you there, I have no doubt
That your boss, de Forest knows about
The mystery of these wireless signals
Alas, too many just mystic symbols.

What youthful "ham" or wirelessman
Can't recall that year back when
Hugo Gernsback and his predictions
Made Modern Electrics older fictions
When Hugo wrote with all his frills
This pioneer with his "Rollo" and "Radar"
His "Broadcast", TV, Sonar
This brilliant writer with distant vision
Even predicted Nuclear Fission.

We're now in year '68
Days of doings—investigate
To still solve the mystery
Of Nucleonic History
For Atoms were old Tesla's dream
With his Molecular Machine
He dreamed and did stunts rarely seen
So, here's to you too newer "hams"
Dig and hustle for Uncle Sam
This century needs your ideas, new
To surpass we pioneers few
It's our turn to climb the hill
To find the Newest, new century's thrill.



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When installation is completed with technical assistance from REL, terminals for the new commercial system will be located at Tagaytay, Luzon; at Cagayan De Oro, Mindanao; and at the repeater site on the Island of Cebu.

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REL will welcome an opportunity to discuss your present and potential multichannel requirements. We will also be pleased to send you technical data plus the current issue of REL's "Credentials in Tropo Scatter". Please write:

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